

LATEST SMARTPHONE, TABLET AND APP REVIEWS

ANDROID ADVISOR

ISSUE
16

BEST CAMERA PHONES

Android takes on iPhone & Windows phone

+ AVOID DATA ROAMING
CHARGES THIS SUMMER



Welcome...

If you somehow missed it, Windows 10 is launching this month for phones, tablets, PCs, laptops and the Xbox One... Pah! We're more interested in the new OnePlus phone that was about to be unveiled as we went to press. OnePlus has already shared some details of its upcoming 2, which we reveal over the following pages. It's going to be a monster!

As we were putting together this issue of Android Advisor from our lovely air-conditioned London office, we couldn't help noticing that big warm yellow thing shining through the window. Summer is here - at last! And that means one thing: holiday time!

For those who will be doing more than sunbathing and sipping Sangria we've put together a guide to the best cameraphones available today, helping you to create the best photographic mementos of your travels. See which phone is best on page 16.

Let's face it, most of us won't turn off our phones and sit back and relax. We'll still be checking our email inboxes, making sure we're not missing out on anything our friends are up to on Facebook, catching up with UK TV and streaming music. So you better make sure all that online activity won't cost you a bomb when you return home. Check out our guide to roaming on page 32.

As always, we hope you've enjoyed this issue of Android Advisor. Feel free to send us your feedback via facebook.com/AndroidAdvisorUK or email marie_brewis@idg.co.uk.

Coming soon: OnePlus 2

The new OnePlus phone is launching on 27 July. Here we look at the already confirmed features

Unlike most phone launches, OnePlus long ago confirmed it would be bringing a new phone to the market this year, and it wasn't long before we knew it would be the OnePlus 2.

OnePlus is gradually announcing the phone's new features on social media, including when we'll first see it, how much it will cost and specifications.

Here we've rounded up all the official details about the OnePlus 2 so you know what's coming.

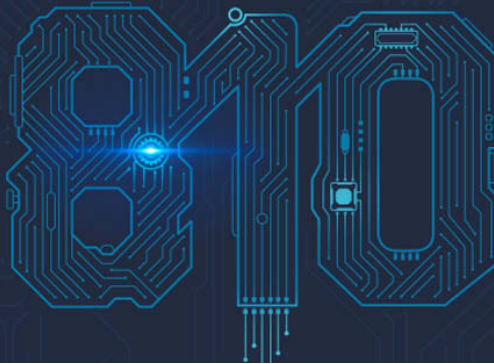


We know that the OnePlus 2 will be announced on 27 July and it will be the 'world's first product launch in VR. The firm has made its own Cardboard for the event and the 30,000 units have sold out.



The firm has also announced that the OnePlus 2 will cost less than \$450, which translates to around £300 - we reckon the OnePlus 2 will cost £299.

THE ONEPLUS 2 CPU



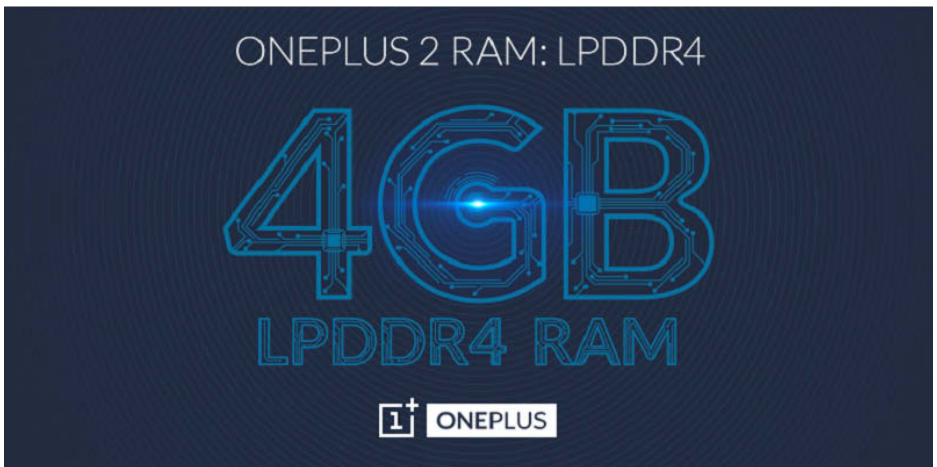
The first specification OnePlus confirmed is a Qualcomm Snapdragon 810 64-bit octa-core chip. This is version 2.1 of the chip and the company promises there won't be any overheating problems.



Next on the list is a USB Type-C port, which is reversible, charges faster and can even be used to charge other devices.



For security, OnePlus is matching rivals including Apple and Samsung by putting a fingerprint scanner on the OnePlus 2. This will presumably be used to unlock the device and authorise payments.



Finally, the OnePlus 2 will come with a whopping 4GB of RAM, which is the most we've seen in a phone. This phone will be a powerhouse!

Will I need an invite to buy OnePlus 2?

Yes. Well, officially in any case. OnePlus has now made the OnePlus One available without an invite any day of the week, but has at the same time confirmed that the OnePlus 2 will use the same invitation-only system.

OnePlus said: "With the experiences we've gained with the One, we will be far more prepared to make the same transition with the OnePlus 2. Yes, the 2 will initially launch with invites.

"We're committed to maintaining razor-thin margins to give as much value as possible back to our users, and this drastically increases our risk.

"The OnePlus 2 will bring the challenges that come along with a brand-new product and, initially, our invite system will help us to manage that risk. It also helps us to be sure that every OnePlus 2 user gets the amazing experience that they deserve."

As before with the OnePlus One, however, it will be possible to buy the OnePlus 2 from a third party. Geekbuying has already confirmed to us that it will stock the OnePlus 2 as soon as possible.



OnePlus 2
concept render

Life gets tougher for alternative mobile OSes Tizen, Firefox and Ubuntu

An increased focus on affordable smartphones running Android has left smaller operating systems behind

The future doesn't look very bright right now for alternative mobile operating systems Firefox OS, Tizen and Ubuntu.

It's always been difficult to attract developers to these platforms, and now smartphones powered by the OSes are also falling behind affordable Android devices on hardware specs. So not only must their users put up with a smaller selection of apps, but also with less powerful devices.

Struggling to compete with Apple in the high-end of the smartphone market, the Android camp has increasingly turned its attention to mid-range and low-end products. While this has been good for consumers looking for more affordable products, it has turned up the competitive heat on Firefox OS, Tizen and Ubuntu.

Case in point: Samsung Electronics' Tizen-based Z1, which after many delays premiered this year in India, a country with a low smartphone penetration. But others also saw the opportunity, and today competition in India and many other developing countries is even more heated than in Europe and the US.

The Z1 has a 1.2GHz dual-core processor and a 4in, 480x800-pixel screen. There is a 3Mp camera on the back and a VGA camera on the front. The price tag in India is now about 5,000 rupees (£51).

For the same money, the new Honor Bee from Huawei Technologies has a 1.2GHz quad-core and a 4.5in, 480x854-pixel screen. The main camera has an 8Mp resolution and there is a 2Mp for selfies. The Bee, which runs Android, has twice the storage at 8GB. Consumers willing to spend another £30 on a more advanced model get a bigger HD screen and LTE.

Firefox OS smartphones are also struggling to compete. Japanese mobile operator KDDI and LG Electronics have developed the FxO, a Firefox OS-based phone with a 4.7in HD screen and LTE. But it costs ¥49,680 (£266), while Android-based smartphones in the same price range in Japan offer bigger full-HD screens, faster processors and more storage.

There are signs that at least Firefox OS developer Mozilla Foundation and Ubuntu

SAMSUNG TIZEN-BASED Z1



developer Canonical are trying to step up hardware efforts.

Mozilla is working to ensure future Firefox OS smartphones meet or exceed expectations in terms of performance and reliability, at all price points, CEO Chris Beard said in a recent email to the community. As part of this reboot, Mozilla CTO Andreas Gal, who co-created Firefox OS and wrote the first lines of code, is leaving Mozilla this week. The push to build £25 smartphones hasn't been as successful as the organization had hoped. The lesson is that Firefox OS phones have to offer something more than just a low price.

Meanwhile, Canonical is working with Spanish hardware maker BQ on a high-end Ubuntu-based smartphone designed to double as a PC when connected to an external screen and keyboard, according to Cristian Parrino, vice president of Mobile and Online Services at Canonical.

It will also be the first Ubuntu device that's not based on a previously released Android smartphone. "For once we'd like to come out with a device at the same time as it comes out on Android," Parrino said.

For example, BQ launched recently its second device running Canonical's OS, the €200 (£143) Aquaris E5 HD Ubuntu Edition, whose Android edition started shipping last year. The smartphone has a 5in HD screen, a 13Mp rear camera and a 5Mp front

camera. While the launch is a step in the right direction, the smartphone lacks LTE and features a low-end quad-core 1.3GHz Cortex-A7 processor from MediaTek.

One development that would help all the OSes is wider support from smartphone manufacturers, but up and coming vendors such as Xiaomi and India's Micromax Informatics have showed little interest in the newcomers, preferring Android instead.

Xiaomi has its own MIUI user interface and Micromax is collaborating with Cyanogen. The alternative operating systems don't have enough scale. When even Microsoft is struggling to compete, it's hard to see how the smaller platforms can make a difference, Micromax chairman Sanjay Kapoor said in an interview earlier this year.

To help with growth, Samsung has installed Tizen on smartwatches and TVs. The latter is a product category Mozilla is going after, as well. Panasonic has started rolling out its first Firefox OS Viera TVs. Success won't come easier in these two sectors, but it could help raise the profile of the two operating systems.

Still, with a combined market share of less than 0.4 percent, all three operating systems face an uphill battle, and if they disappear, it would be a loss for consumers, because it would mean less competitive pressure for Apple and Google.

5G networks look to new frequencies to deliver gigabit speeds

The telecommunications industry is looking for new frequencies in which to operate a new generation of mobile networks

If operators are to build 5G mobile networks with download speeds at 10Gb/s and above, they are going to need a lot more spectrum, but getting it won't be easy.

The amount of spectrum allocated to 5G will determine how fast networks based on the technology will eventually become. Until recently, only frequencies below 6GHz have been considered for mobile networks, mostly because they are good for covering large areas. But there's now a growing need to unlock new spectrum bands in the 6- to 100GHz range too, attendees at the recent LTE and 5G World Summit conferences in Amsterdam heard.

The use of spectrum in these bands is immensely important for 5G networks to be able to offer multiple gigabits per second, Robert DiFazio, chief engineer at wireless R&D company InterDigital Communications, said. By raising communication speeds, they are also expected to help lower latency in mobile networks.

Even though spectrum from 6- to 100GHz won't be used in cellular access networks for at least another five years, vendors are keen to show they can handle all the technical challenges those frequencies present. The development of WiGig, which uses the 60GHz band, has already showed that using such high frequencies works, and on the show floor in Amsterdam, Huawei

Technologies and Samsung Electronics both talked up pilot studies of other technologies they have conducted.

For the potential of spectrum above 6GHz to be realised, a new generation of antennas will be required, capable of directing multiple beams of data to different users at the same time. New systems will likely also need new modulation schemes to encode the data on the radio waves more efficiently.

There are ways for mobile networks to increase download speeds using existing spectrum, including using carrier aggregation or sharing spectrum with Wi-Fi networks. But at the end of the day, none of these options come close to the potential that as-yet-unused frequency bands above 6GHz offer. There is nowhere else to go but up, according to Samsung.

Rolling out networks isn't just about hardware and software, according to regulators. "We have made clear our intention to make large quantities of spectrum available in these frequencies, which is increasingly also the view of other regulators around the world," said Andrew Hudson, director of spectrum policy at British regulator Ofcom, who spoke on the subject at the Amsterdam conference.

The current focus of Ofcom's work isn't whether to make spectrum available, but how to identify the best spectrum in this range. This involves finding bands with a

combination of good physical characteristics and good prospects for international harmonization, while taking into account current use, according to Hudson.

A final decision on what - if any - bands will be allocated isn't expected until 2019.

After technical and regulatory challenges have been overcome, the networks also have to be rolled out. If extreme speeds are the upside of frequencies over 6GHz, poor coverage is the downside. These high frequencies don't have good reach and aren't very much use if you want to penetrate walls. To get around these weaknesses, mobile operators will have to install lots of smaller base stations, but finding enough places to put even the current generation of small-cell base stations has already proved difficult.

So taking full advantage of spectrum bands above 6GHz won't be easy, but if equipment and device vendors want 5G to become something more than an incremental upgrade over the LTE networks that exist in 2020, all technical and political challenges have to be overcome.

The first commercial networks using 5G technologies are expected to go live in 2020, but will initially use spectrum below 6GHz because the infrastructure is already out there for those bands, according to DeFazio: Networks using the new frequency bands will only arrive later.

GSM switch off good news for phone users, not for connected devices



Asian and US operators are more aggressive than their European counterparts

Carriers around the world are converging on 2017 as the year to turn off their GSM networks, with three operators in Singapore announcing Monday their plans to reuse their GSM spectrum for other services.

The end of GSM will free up more bandwidth for faster 3G and 4G network technologies - but will also force users of older connected devices that depend on GSM networks to upgrade or replace them.

On Monday Singaporean operators M1, Singtel and StarHub became the latest operators to set a timetable for turning off their GSM networks. They will do so on April 1, 2017, following in the footsteps of Telstra in Australia, which plans to do so by the end of 2016, and AT&T in the US, which will flip the switch on 1 January 2017.

For many mobile users, the switch-off could pass almost unnoticed. Today, the majority of mobile customers have phones that also connect to 3G and 4G networks; only a small percentage of subscribers still use GSM-only phones, according to the Singaporean operators. When Telstra made

its announcement last year, it said GSM accounted for less than 1 percent of traffic.

The reasons for turning off GSM networks are technical and financial. Turning them off means the spectrum can be reused by more efficient 3G and 4G networks, which can use the same bandwidth to carry more data or serve more customers - and hence generate more revenue. Having one less network to manage should also result in lower costs for operators.

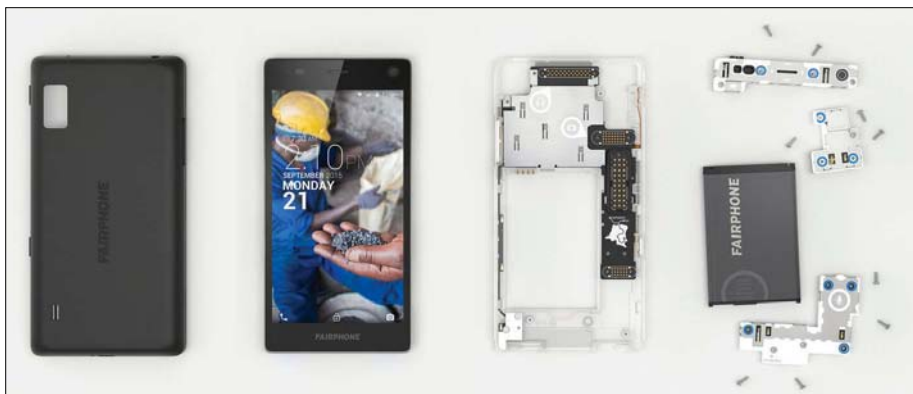
The rapid pace of phone replacement means most phones in use are ready for the switch to 3G or 4G - but that's not the case for many connected devices, which tend to have far longer working lives. Because of its low cost and good coverage, GSM is a popular option for so-called machine-to-machine (M2M) connections used to link vehicles, alarms, vending machines and a host of other connected devices. There were about 160 million of them by the end of last year, according to Machina Research. A new generation of chipsets is laying the groundwork for cheaper LTE modems for such applications, but the majority of M2M

devices shipping today rely on GSM, Machina Research CEO Matt Hatton explained.

Upgrading the network will be worth it, though, according to AT&T. The higher speeds offered by 3G and 4G networks will enable enterprises to deliver better M2M applications. For example, video cameras for real-time streaming and driver dash cameras for fleet trucks will be possible.

Not all operators are as aggressive in their plans to turn off GSM. In general, European operators are being a bit more cautious. For French network operator Orange, there will no big switch off, according to Yves Bellego, director of Technical and Network Strategy at the French operator. Norwegian operator Telenor plans to turn off its 3G network in 2020, and its GSM network in 2025, it recently announced.

The reticence to make the move isn't just down to wanting to support existing M2M devices. The European operators still have lucrative roaming businesses and could run into some regulatory issues if they decide to turn off GSM networks in the next couple of years, according to Hatton.



Photography by Fairphone

Meet Fairphone 2: the socially responsible smartphone

We report on the Fairphone 2: Fairphone's second-generation socially responsible smartphone that will start shipping later this year

Fairphone, the Dutch company that aims to sell socially responsible smartphones, is working on a second model that can be repaired with little hassle and won't easily break. The company is also sticking with its goal of using conflict-free or fair trade minerals.

One of the company's key aims with the Fairphone 2 was to extend the longevity of the product. Making it easy to repair is part of that. For example, it will be possible to replace the display on the Fairphone 2 in less than a minute, the company promises. After removing the case and battery, the two clips that lock the display in place are slid towards each other, and then the entire unit can be taken out, CTO Olivier Hebert said in a blog post on Tuesday.

The receiver, rear camera and speaker units can be repaired with the help of a screwdriver. To guide users, each unit is connected to the chassis with a set of colour-coded screws. Fairphone is betting that buyers will sacrifice slimmness for a smartphone that's easier to repair. The result is a phone that's 11mm thick.

The hardware architecture also opens the door for future upgrades. All of the individual components can be replaced, provided they fit within the design of the original unit and can use the existing electrical interfaces. However, software complexities need to

be addressed for upgrades to be possible, Hebert said without delving into the details.

A second goal was to build a device that doesn't easily break. Most current smartphones are simply too fragile, according to Hebert. The Fairphone 2, on the other hand, should survive a drop of about 2m on to concrete. The robustness is in part possible thanks to a rubber rim that wraps around the screen. Fairphone decided against making the phone completely sealed to keep out water and dust, as doing that conflicted with other design goals, especially the ability to open and repair the device.

The aim is still to manufacture a smartphone that doesn't use minerals from conflict zones, is recyclable, and is made by workers who are treated well. The Fairphone 2 will be available for preorder before the end of August, and then ship during the following couple of months, the company said. Pricing wasn't announced.

Hardware specs include a Qualcomm Snapdragon 801 processor and a 5in, Full HD screen. The camera has an 8Mp resolution and there is 32GB of storage that can be expanded using a microSD card. The LTE smartphone also has 2GB of RAM and two SIM slots. The OS will be Android 5.1.

The first model, of which Fairphone sold 60,000, scored 7 out of 10 for reparability in a teardown test by repair website iFixit.

Positives included that it's easy to open up the device and access the components. However, the glass is fused to both the display and the display frame, which increases repair costs - a mistake that Fairphone has learned from.

In general, today's high-end smartphones are a mixed bag when it comes to ease of repair. Apple has a reputation for building products that are difficult to fix, but the iPhone 6 and 6 Plus both got a 7 out of 10 score on iFixit. The company still uses proprietary Pentalobe screws, and it doesn't share repair information with independent repair shops or consumers. But the display assembly comes out easily and the battery is easy to access.

For people who want a high-end Android smartphone that's easily repaired, the G4 from LG is a good option. It was awarded an impressive 8 out of 10. The only drawback is that the glass and LCD will need to be replaced together if one or the other breaks.

Two other top-of-the-range smartphones, the Galaxy S6 from Samsung Electronics and HTC's One M9, didn't fair as well, scoring 4 and 2 out of 10, respectively. Strong adhesive on the rear glass makes it very difficult to gain entry to the S6's innards. On the One M9 adhesives make many components difficult, and even dangerous, to remove and replace, iFixit said. [\[E\]](#)

Xiaomi and Micromax pressure established smartphone makers

Latest devices have the potential to reset customer expectations

Indian smartphone manufacturer Micromax and Xiaomi from China have given the low-end market a shake-up with their latest products, and even if the devices don't go on sale around the world, their launches will be felt globally.

The Micromax Yu Yuphoria like the Xiaomi Mi 4i's combination of impressive specs and aggressive pricing will put pressure on the likes of Samsung and Motorola to step up their efforts in the segment for sub-£200 smartphones.

"It's more pain for the established vendors. These devices have the potential to reset customer expectations," said Ben Wood, chief of research at CCS Insight.

The Yu Yuphoria was launched recently in India. It's an LTE smartphone that will cost about £72 without a contract in that country. It has a 5in, 720x1280-pixel screen and a Snapdragon 410 processor. The specification also includes an 8Mp main camera and a 5Mp front snapper, as well as 2GB of RAM and 16GB of integrated storage. While smartphones in this price category were once known for their cheap-looking designs, the Yuphoria has a metal frame to help give it a more premium feel.

The Xiaomi Mi 4i is more expensive at around £130, though it offers better specs. The 5in screen, for example, has a 1080x1920-pixel resolution, while the processor is Qualcomm's more powerful Snapdragon 615. The main camera has a 13Mp resolution. It, too, has a 5Mp front snapper, LTE, 16GB of integrated storage and 2GB of RAM.

The two devices share another common feature: they leave competing devices in the dust by offering smartphone buyers a lot more bang for their buck.

The second-generation Moto G from Motorola may have a 5in, 720x1280-pixel screen and an 8Mp camera just like the Yuphoria. The front camera has, however, only a 2Mp resolution, the amount of storage and RAM is half that of the Yuphoria, and the price tag is still £140. There's also an LTE



XIAOMI MI 4I

version available in some parts of the world that makes the price difference even larger.

Samsung's mid-range smartphones also come off looking expensive, in comparison. The Galaxy A5 is just like the Mi 4i, an LTE smartphone with a 13Mp camera, 16GB of storage and 2GB of RAM. However, it has the less powerful Snapdragon 410 under the hood and the 5in screen isn't full HD. Instead, users have to make do with 720x1280 pixels and still pay about £299.

Having the edge

Even if the newcomers offer great specs for little money, Samsung and Motorola both think that they have an edge.

"They hope they'll be able to command a premium for their brand, but that margin is being eroded all the time," Wood explained.

The Yu Yuphoria and the Mi 4i are unlikely to go on sale in the US and Europe, because Micromax and Xiaomi continue to focus on their respective home markets, along with Bangladesh, Sri Lanka, Nepal and Russia for Micromax; and India, Taiwan, Singapore, Malaysia and Indonesia for Xiaomi.

However, the repercussions will likely result in better products that will go on sale globally. Samsung is dependent on this segment of the market to keep its volumes up, so it must come up with a competitive response, according to Wood. And the Korean company sells its products in as many markets as it possibly can. With the exception of the second-generation Moto G with LTE, Motorola has also shipped its affordable smartphones all over the world.

There are several reasons for the ascent of Micromax and Xiaomi. The biggest one is arguably that developing smartphones has become much easier, and companies no longer need a big research and development department.

"Virtually all phones are manufactured in China or Taiwan, and the ecosystem there is so ripe that everyone gets access to the same components and materials," Sanjay Kapoor, chairman at Micromax, explained in an interview earlier this year. "So if you manage your overheads right, you can build world-class products." [\[X\]](#)

MICROMAX YU YUPHORIA



ARM: Smartphone rivalry drives faster chip development

New mobile chips are now being developed at a yearly pace to line up with smartphone announcements

Heated competition in the smartphone and tablet markets has required chip makers to speed up the pace at which they release new processors, Simon Segars CEO of ARM revealed in a recent interview.

Following in the footsteps of Apple, rivals including Samsung and HTC are upgrading their flagship devices on a near yearly basis, adding better displays, faster chips and more memory to entice customers into buying their products.

The company's designs the microprocessors used in most of those devices, and the increased competition means it's having to push out faster, more power-efficient chips at a quicker pace, the CEO revealed.

"We're always going to be looking to deliver more performance, make the best use of manufacturing technology... and deliver better system-wide efficiency," he added.

Rapid progress

ARM creates chip designs that it licenses to other companies such as Samsung, Apple and Qualcomm, who then tweak those designs for use in phones and tablets. A recent report from The Linley Group says that the company is making rapid progress on its next major processor design, which could turn out to be the quickest design upgrade it's yet produced.

The chip could be rolling off production lines by the end of next year and appearing in mobile gadgets soon after that, according to the report. That would mean it arrives just a year after its predecessor, the Cortex-A72, which was announced in March and is expected in devices at the end of this year.

The A72 also arrived sooner than expected, but it was a much-needed upgrade to its predecessor, the Cortex-A57. That chip was announced in 2012 and took two years to find its way into mobile devices - perhaps twice as long as the current chips.

Segars declined to comment on specific plans for the newest chip, but he acknowledged that ARM has been accelerating its design efforts. That's possible partly because ARM has more CPU designers than it had in the past, he said.



Beyond the CPU itself, ARM is looking at ways to improve memory and to speed up data exchange between components, he said.

ARM's yearly upgrade cycle mirrors that of Apple, which releases new A-series chips for its iPhones on a similar 12-month schedule. Apple's new chips typically include upgrades for the CPU, connectivity and graphics components.

The tech industry has grown accustomed to the pace at which vendors upgrade PC lines, which happens every 12- to 18 months. ARM is meeting the demands of a smartphone industry that's heading toward a cycle of six months to one year, explained Dean McCarron, principal analyst at Mercury Research.

Refresh cycle

The faster refresh cycle is the fruit of investments ARM made a few years back to help it stay ahead of Intel, its primary competitor, McCarron added. Intel's smartphone chips are used in just a few

handsets, but two years ago the company said it would upgrade its mobile chips faster in an effort to break ARM's dominance.

In 2014, Intel released new Atom chips codenamed Merrifield and Moorefield, and earlier this year it shipped chips codenamed Sofia for low-end smartphones. The Sofia processors were made in conjunction with Chinese company Rockchip, which has experience turning around processor designs in a matter of months, McCarron argued.

Next year, Intel will ship a high-end Atom chip called Broxton, which has a modular design that allows Intel to modify the chip and deliver updates at a faster pace. Broxton supports Intel's larger plan to deliver products that can be customised more easily, making its model more similar to that of ARM.

For now, the intense competition has resulted in new chips coming to market more quickly, but designing and manufacturing chips is a complex business, and it remains to be seen how long the yearly upgrade cycle will continue. [\[E\]](#)



Fingerprint sensors on their way to more smartphones

Cheaper sensors and broader software support will make fingerprint authentication more accessible to app developers and service providers, reveals [Mikael Ricknäs](#)

Fingerprint authentication will become a lot more common on smartphones of all prices as sensors get cheaper, and Google's integration of the technology in the next version of Android will make it much easier for app developers and service providers to make use of them.

Today, fingerprint sensors are mainly available on high-end models from Apple and Samsung Electronics. But that is about to change, according to sensor manufacturers Synaptics and Fingerprint Cards.

The latter has seen a growing interest in its technology from smartphone manufacturers in recent months, as well as a strong increase in orders. As a result, the company has raised its revenue estimate for the year from about 1.5bn- (€115m) to 2.2bn Swedish Krona (€191m).

"This market is really starting to take off," said Jürgen Lantto, CEO at Fingerprint Cards, who anticipates that half of all smartphones sold next year will have the feature.

Fingerprint Cards sensors are already used in the Ascend Mate 7 from Huawei Technologies and Oppo's R7 Plus, which was launched in May. Synaptics, which makes the sensor in the Samsung Galaxy S6 and S6 Edge, is equally sure that smartphones with fingerprint sensors will become more popular.

"The market is hot, and the adoption rate across a broader range of products will grow faster now," said Anthony Gioeli, vice president of marketing for Synaptics biometrics business unit.

Google adding native support for fingerprint sensors in Android M is a major reason why the technology has started to take off on a larger scale. The native support will make it easier for smartphone manufacturers to integrate fingerprint sensors in their devices. It will also make life easier for developers, who can use Android APIs to integrate fingerprint recognition in their apps instead of proprietary ones developed by the sensor makers, Lantto said.

Developments on the hardware side are also lowering the bar for fingerprint recognition. Prices have come down by about 25 percent in the past year, and they will continue to drop as volumes increase, Gioeli said. It's already possible to build a £75 smartphone with fingerprint recognition, according to Lantto.

The launch of the iPhone 5s with Touch ID proved to be a blessing and a curse, at least a short-term one. On the plus side, it helped increase awareness. But many competing smartphone vendors wanted a touch sensor, just like Apple had got from its 2012 acquisition of AuthenTec, instead

of the swipe sensors Fingerprint Cards and Synaptics had developed. It took six- to nine months to regroup, Lantto said.

Beyond Apple and Samsung, many Chinese vendors have been adding fingerprint sensors to their smartphones. Huawei will certainly offer it in more future models, according to a spokesman at the company. Using fingerprints as opposed to PINs or patterns has proved ideal for heavy smartphone users, he said. Fingerprint Cards has recently added Yulong and Gionee to its list of customers.

Many of the more established vendors, such as LG Electronics and Sony, are still on the fence. HTC recently launched the One M9+ for the Chinese market.

Mobile payments will also likely help fuel the availability of fingerprint recognition on more devices. If Google wants its upcoming Android Pay service to take off, it needs to convince more vendors to integrate the technology. Allowing Google to offer the same functionality as Apple Pay. Just adding fingerprint recognition to this year's Nexus smartphones won't be enough. The same goes for Samsung. If the company wants Samsung Pay to be successful, more devices than the Galaxy S and Note products will need to be equipped with the technology.



Saving lives with wearable tech

We reveal how we could be using wearable tech to help the elderly and save lives

For many consumers, wearable tech is still a gimmick, sitting somewhere between the realm of trendy fashion items, kids' toys and fitness accessories.

For years its role focused on the lucrative fitness markets, meaning it has largely missed out on opportunities to offer positives in healthcare and law enforcement. It's no real surprise, as the value of wearable tech in the fitness market alone could exceed \$16.1bn this year, but around a third of people buying a wearable product will likely abandon it within six months. Suggesting a new approach is needed to ensure consumers continually use their products.

UK police have been wearable video recording devices for the past 10 years and the New York Police Department have been piloting Google Glass since last year, largely due to an increased need for accountability - highlighting two great examples of extremely positive uses of wearable technology.

Volkswagen recently announced an app for the Apple Watch allowing parents to monitor the driving habits of their teenage children. Car-Net offers automatic incident

notifications, roadside assistance and the 'Family Guardian,' which notifies parents when the driver exceeds the speed limit.

The US and Japan have so far led the way on developing and adopting wearable tech in healthcare, aimed at helping chronically ill and older people. In the UK, however, the elderly are only now being properly included in the debate.

Wearable technology has a huge part to play in helping people in later life, but it will be up to developers to capitalise on this and appeal to the older demographic. Panic buttons, wearable emergency call bracelets and neck chains already save lives and are vital for older people living on their own. This technology, however, has been around for a long time and has far-reaching potential; helping the elderly live longer and more independently, a trend often called 'aging in place.'

Auto-dialling panic alarms fitted into the phone, can then be activated by Wi-Fi pendants, which are cheap and useful. A step up is fall-detection systems, that use ceiling mounted optical and acoustic sensors to

detect motion in the room. It can then phone an emergency number for assistance and is enhanced by a voice-activated function asking the user how they are feeling. If they respond, the alarm will cancel, so it won't go off if they decide to just take a nap.

For older people, the cost of going into a home can be startling. Residential care for older people costs tens of thousands of pounds each year, and anything that can help them stay in their own home for longer can only be a positive thing.

Wearable technology has a huge part to play in helping them in later life and it will be up to the developers to help capitalise on this and prove it can play a key role in benefiting lives. Whether it's reminding someone to take medication, monitoring their sleep patterns, knee braces with stress sensors or movement recorders, the potential of wearable tech in healthcare is vast. Technology developers clearly want to target lucrative markets and fitness certainly is that, but as the population ages, more people could benefit from a refreshed focus from developers.



Photography by Dominik Tomaszewski

These days being able to take decent photos is a must for smartphones. With this in mind, we put nine flagship models through their paces to find out which performs best for photos, videos, selfies, macro and in low light

For many people, a phone's cameras are one of the biggest priorities when choosing a new handset.

Since you carry your phone everywhere, you're more likely to use it to take photos than a separate camera. Thanks to the fact that phones have become rather talented at taking photos and videos, they might even be better quality than your current camera.

There are, of course, a few downsides, one of which is that you won't get a zoom lens for getting in close when you can't physically move. Even the best phone cameras struggle to match the quality

of even a budget DSLR lens because they're so small, and you'll only be able to get blurred backgrounds using software effects.

However, phones have their own special effects. They vary from model to model, but you can expect to find burst shooting, slo-mo video, time-lapse, automatic selfie capture when you smile or say "cheese", and even light painting on the new Huawei P8.

We've gathered together as many of the latest flagships as we could lay our hands on, including the Samsung Galaxy S6, LG G4, Huawei P8 and both of the current iPhones, so you can see how their cameras perform

in good light outdoors, poor light indoors, in close-ups, for video and also for selfies using the front camera.

Around half of the phones here can shoot video at 4K, though you'll need a 4K monitor to view the video clips at their full detail. However, you'll still benefit from the extra resolution even on a 1080p screen, but beware that you need a fairly powerful laptop or PC to play back 4K video smoothly.

Note that the Xperia Z3 and Z3 Compact share the same front and rear cameras, so you can use the photo examples here to judge both phones.

BEST PHONE CAMERA 2015



CAMERA SPECIFICATIONS

	MAIN CAMERA RESOLUTION	FRONT CAMERA RESOLUTION	VIDEO (MAX. RESOLUTION)	OPTICAL STABILISATION (OIS)	FLASH	DEDICATED CAMERA BUTTON
iPhone 6	8Mp	1.2Mp	1080p at 60fps	No	Dual-tone LED	No
iPhone 6 Plus	8Mp	1.2Mp	1080p at 60fps	Yes	Dual-tone LED	No
Google Nexus 6	13Mp	2Mp	2160p at 30fps	No	Dual-LED ring	No
HTC One M9	20Mp	4Mp	2160p at 30fps	No	Dual-tone LED	No
Huawei P8	13Mp	8Mp	1080p at 30fps	No	Dual-LED	No
LG G4	16Mp	8Mp	2160p at 30fps	Yes	LED	No
Nokia Lumia 930	20Mp	1.2Mp	2160p at 30fps	Yes	Dual-LED	Yes
Samsung Galaxy S6	16Mp	5Mp	2160p at 30fps	Yes	LED	No
Sony Xperia Z3 Compact	20.7Mp	2.2Mp	2160p at 30fps	No	LED	Yes

OUTDOOR PHOTO



Apple iPhone 6

Most phone cameras excel in bright conditions and low contrast, so it's no surprise to see the iPhone 6 performing well here. We also like the aspect ratio and wide-angle lens.



Apple iPhone 6 Plus

There's little to choose between the two iPhones here.



Google Nexus 6

The Nexus 6's white balance is a bit off, leading to a cooler-looking photo compared to the warm iPhones. Where it shines is the high-resolution sensor which captures lots of sharp detail, and the lens is sharp to the edges.



HTC One M9

Worse than the Nexus 6's auto white balance is the One M9's. It has also blown out the highlights in the clouds. Aside from this, though, it's a nice sharp image with lots of detail.



Nokia Lumia 930

As with the 930's other photos, this one exhibits slight underexposure and a bit too much contrast - made obvious when you compare it to the Galaxy S6. The white balance isn't right either.



Huawei P8

This is a well-exposed image with reasonably accurate colours. The wide field of view means it captures more than most phones, too. Plus, there's very little evidence of compression artifacts with plenty of detail in the brickwork of St Pancras hotel.



Samsung Galaxy S6

If we had to pick a winner for the St Pancras photo, this would be it. Despite having a 16:9 sensor, the wide-angle lens means more of the scene is captured than the LG G4, and there's more sharp detail throughout the photo. White balance is also spot on.



LG G4

Exposure and white balance are good, and we marvelled at the level of detail in the 16Mp image when zooming to 100 per cent. We'd prefer something other than a 16:9 sensor, but there's enough resolution to crop off the sides and still end up with plenty of detail.



Sony Xperia Z3 Compact

A slightly cool white balance, but the Z3 Compact does a good job in bright light. The image is well exposed and nice and sharp. At 100 percent there's evidence of compression, but most people will be happy with the Z3's performance.

OUTDOOR PHOTO



iPhone 6

One of the iPhone's strengths is that colour accuracy is always excellent. There's a lack of detail when you zoom in due to the low-resolution sensor, but they're fine for printing out or sharing online.



Apple iPhone 6 Plus

The 6 Plus excels in good light, with sharp detail and fantastic colour accuracy. The default camera app also has an automatic HDR mode, which increases the dynamic range for high-contrast scenes.



Google Nexus 6

It doesn't have the bright greens of the iPhone photos, but the Nexus 6 does a decent job here. Highlights are clipped, but it's far from the worst photo in this group.



HTC One M9

On its own, you'd be hard pushed to criticise the One M9's park photo. It's well exposed and only when you zoom in do you notice the slightly soft focus. But again, there's a colour cast that turns the path here almost beige when it should be grey.



Nokia Lumia 930

The 930 appears to have a limited dynamic range given that the sky is blown out, yet the trees appear as if the photo was taken when the sun went in. But as you can see from the shadows on the path, conditions were the same for the other cameras.



Huawei P8

In attempting to avoid losing detail in darker areas, the P8 has overexposed this photo and the clouds are blown out and lack detail. White balance and detail are both good though.



Samsung Galaxy S6

Once again, the S6 flexes its photographic muscles and delivers a stunning photo with great colours, lots of sharp detail and good dynamic range. Yes, the clouds are blown out, but no phone's camera here can do better without using its HDR mode.



LG G4

The G4 has also blown out the clouds, but as with the Huawei P8, it's still a pleasing photo with accurate colours. At 100 percent, details are a little sharper than the P8's, too.



Sony Xperia Z3 Compact

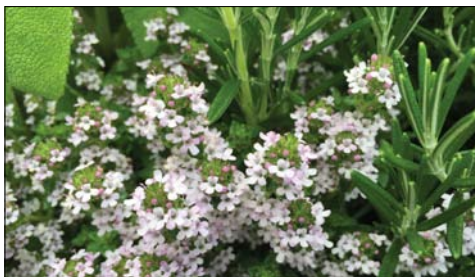
The Z3 again shows that it can't keep up with the best here. The photo is fractionally overexposed and white balance is on the cool side. Detail levels and sharpness are impressive, though.

MACRO PHOTO



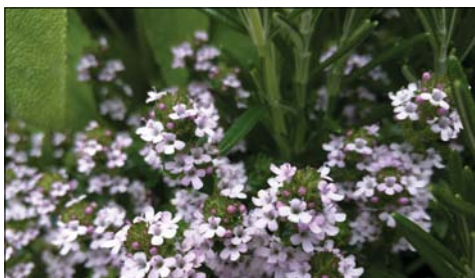
Apple iPhone 6

It doesn't have the best macro capabilities of our group of phones here, but the iPhone 6 can easily hold its own. Details are sharp and - just as importantly - colours are wonderful.



Apple iPhone 6 Plus

Once more, it's virtually a carbon copy of the iPhone 6, and we're more than happy with the iPhone 6's macro photo



Google Nexus 6

The Nexus 6's macro photo shows poor white balance, but it's able to focus slightly closer than the iPhones.



HTC One M9

Not a bad photo at all from the HTC, although it isn't the sharpest photo in the group.



Nokia Lumia 930

The Nokia 930 can't focus as close as the rest of the group, but its macro photo is sharp and well exposed.



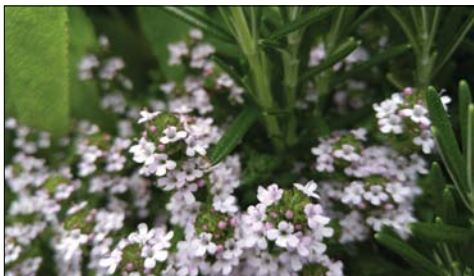
Huawei P8

The P8 almost managed to focus as close as the LG G4, but it's hard to tell when it's in focus using the stock camera app. Highlights on the petals are clipped, too.



Samsung Galaxy S6

It can't match the LG here, but the Galaxy S6 yet again proves it can capture sharp detail and sumptuous colours.



LG G4

The G4 impressed us with its macro abilities: focus is crisp and the delicate pink petals are perfectly exposed.



Sony Xperia Z3 Compact

White balance is a problem for the Z3, and it can't focus particularly close either. Detail levels aren't as good as the Samsung or LG either.

LOW-LIGHT PHOTO

VEGEMITE



Apple iPhone 6

Low light is one of the areas where you can clearly see the difference in the capabilities of the two iPhones' cameras. It isn't as obvious unless you zoom in and look at the images at 100 percent, but suffice to say that the 6 simply isn't as good as the 6 Plus.



Apple iPhone 6 Plus

Aside from the muted colours, this is a good result. There's very little noise - far less than the LG G4 - but the photo isn't as sharp.



Google Nexus 6

You might think we haven't tried hard enough with the Nexus 6, but no matter what we did, we couldn't get a sharp photo in these lighting conditions. It does a good job of suppressing noise, though.



HTC One M9

The M9 doesn't embarrass itself in low light thanks to great colour reproduction. However, zoom in and you'll see details are smeary, which appears to be due to over-enthusiastic noise reduction.



Nokia Lumia 930

Once again a little underexposed, but the 930 is eminently capable in low light. Details are sharp and there's hardly any noise.



Huawei P8

Not a great show from the P8 again. Colours are undersaturated and there's evidence of heavy-handed noise reduction when you zoom in, meaning detail levels are reduced.



Samsung Galaxy S6

A little soft, but overall a respectable result from the Samsung. Colours are good and there's very little noise.



LG G4

The G4 almost aces this test, delivering a sharp photo with amazing colours. The only niggle is noise, which is evident when you zoom in, but it's much harder to see when looking at the overall photo. A fantastic effort here.



Sony Xperia Z3 Compact

The Z3 Compact isn't great in low light. The colours are a bit undersaturated, but the biggest issue is that focus is very soft and therefore there's a distinct lack of sharp detail.



Apple iPhone 6

In selfie land, the iPhones show their weakness: the low-resolution 1.2Mp camera. Although well exposed, there's a distinct lack of detail.



Apple iPhone 6 Plus

As you'd expect, you get the same result with the iPhone 6 Plus as it has an identical front camera.



Google Nexus 6

A pretty good result from the Nexus 6's front camera, with good skin tones and detail.



Huawei P8

An overly sharp shot from the P8, with unflattering skin tones.



HTC One M9

The One M9's selfie is pretty good, with warm skin tones and enough sharp detail without bringing out skin textures (wrinkles, pimples, freckles) you might rather stay hidden.



LG G4

Oddly the G4 defaults to a mirrored mode, which is why this photo is flipped vertically. Skin tones are excellent.

SELFIE (CONTINUED)



Samsung Galaxy S6

This was taken with the S6's Beauty mode at level 2 (fairly low), but it still smooths out detail too much for our liking. The S6 has a very capable front camera, however.



Nokia Lumia 930

Another underexposed photo from the Lumia 930. Skin tones are good, but the 1.2Mp resolution means there's not much detail.



Sony Xperia Z3 Compact

A dismal, ghostly effort from the Z3 here.

VIDEO

Apple iPhone 6

Considering it has no optical stabilisation and is limited to 1080p, the iPhone 6's footage is very good. It has a good level of detail, but more importantly it doesn't struggle to focus thanks to its magical Focus Pixels and has natural-looking colours

Apple iPhone 6 Plus

No surprise that the 6 Plus's footage is virtually identical to the 6's. The advantage is that it has optical stabilisation, which gives a more cinematic feel, just as Apple claims.

Google Nexus 6

Like all phones capable of shooting 4K video, the Nexus 6 captures a lot of detail considering how highly it compresses footage. While exposure and colour accuracy are good, it was annoying that the camera kept refocusing even though we weren't moving the phone.

HTC One M9

This was the most disappointing 4K footage. Not only does the HTC One M9 lack stabilisation, which led to shaky video - don't forget this will be magnified on a large TV - but it also showed up poor white balance with a strange magenta cast.

Huawei P8

The P8's video is much poorer than we'd expected. It's limited to 1080p but even so, there's much less detail than the iPhone 6 and 6 Plus capture.

LG G4

The best on test for video, capturing loads of sharp detail and overcoming shaky hands thanks to great stabilisation.

Nokia Lumia 930

Our 930 didn't have the Denim update, so was limited to shooting at 1080p. It can

capture 4K at 30fps with the update, though. Even so, the 1080p footage was mediocre at best. There was a surprising lack of detail and colours weren't as natural as we'd like.

Samsung Galaxy S6

The Samsung Galaxy S6 comes in a close second to the G4 here. Its 4K video looks great on a large TV, with realistic, life-like colours and good stabilisation.

Sony Xperia Z3 Compact

The Z3 Compact's 4K footage is also detailed but the lack of stabilisation lets it down.



See *PC Advisor* online to watch the videos:
tinyurl.com/opq2ghj

VERDICT

There are two clear winners here: the LG G4 and Samsung Galaxy S6. Both take excellent photos and videos, and are also great phones. If you want us to declare only one winner, then the G4 narrowly pips the S6 to the post by virtue of its excellent three-axis stabilisation.

There's a lot more to consider than just photo and video quality when picking the best phone camera, of course. The screen resolution and brightness play a part, as does the camera app itself, which determines the features and settings on offer.

Only two phones here have dedicated shutter buttons: the Sony Xperia Z3 Compact and Nokia Lumia 930. However, neither can challenge the best cameras here, so it isn't a reason to choose them instead.

Naturally, you shouldn't only consider the camera when buying a phone: the operating system, screen size, battery life and price will also be factors.

We can't tell you which phone is best for you, but hopefully these comparisons have proved helpful in making your choice.

HOW WE TESTED

To make this comparison fair, we set up each phone to the highest resolution available for photos and videos. We also took each shot within a minute or so of each other to ensure lighting conditions were as similar as possible.

All photos and videos were taken handheld, rather than on a tripod because that's how you'll use the phone in real life. It also allowed stabilisation systems to prove their worth, and we ensured they were all turned on where present. We selected automatic modes and didn't tap the screen to choose focus or exposure since none of our test shots was designed to trick the cameras: they should all perform well with automatic exposure. Again, most people will rely on auto mode to capture the moment.

As you can see in our shot of St Pancras, the field of view varies between phones. These were all taken from precisely the same spot, so it's easy to see which have 16:9 and which have 4:3 sensors. In each case, we made sure we used the highest resolution available -

many Android phones default to 16:9, which chops the top and bottom off the photo for phones with 4:3 sensors. (Note, we made a mistake with the HTC One M9, shooting at 16:9 instead of 10:7 because it isn't obvious which is the highest resolution. Rather than reshooting later in different light conditions, we decided to use the cropped images instead)

One of the most interesting observations during the test was how much the experience of taking photos and videos differed with each phone. For example, the Samsung Galaxy S6's bright AMOLED screen made it easy to frame photos in sunny conditions.

The LG G4's screen wasn't as easy to see, but the extra resolution meant it was easy to see whether a macro photo would be blurry or not before taking the shot. By contrast, the Z3 Compact's 720p screen made it impossible as the detail simply wasn't there.

All the photos in this group test can be viewed on the *PC Advisor* website at tinyurl.com/opq2ghj.



ANDROID M

iOS 9 vs Android M

With new versions of iOS and Android due this autumn, we've decided to compare the two

In June, Apple announced iOS 9, the next-generation of its iPhone and iPad operating system. It will go head-to-head with Google's Android M at the top of the Android phones and tablets market, so we decided to compare and contrast the two leading mobile platforms.

Release date

We now know definitively that both iOS 9 and Android M are in the works. What we don't know is when exactly they will launch. But we can make some good guesses: iOS 9 will launch in 'Fall 2015', according to Apple. It wasn't specific because it doesn't want to give away the date of the next iPhone and iPad launches, which will likely be the same day. But expect a new OS in September 2015.

Meanwhile, at I/O 2015 Google unveiled an Android M Developer Preview, confirming the existence of the next flagship Android OS. The final version of Android M will launch with a new Nexus phone in October or November this year. But unlike iOS, we won't

then see a rapid roll out to all compatible devices: Android M will appear first on other Nexus devices, and within a few months make the move to flagship phones and tablets made by third-party OEMs such as Samsung, LG and Sony. Unless you are a Nexus guy, don't expect to get Android M on your device until late 2015 or even early 2016.

Betas

For the first time I can remember, Apple is running a public beta of its iOS update. You can try out the iOS 9 beta in a few months, but you can sign up now by signing up at beta.apple.com. Developers can download the first beta of iOS 9 immediately, though.

Similarly, if you want to get your hands on Android M now, you can download the Android M Developer Preview, but only if you have a Nexus 5, 6, 9 or Player. As with the iPhone equivalent, it should be said that developer preview software is really only for, er, developers. Expect bugs and frequent updates, as well as missing features.

Compatibility

This is one of the fundamental differences between iOS and Android. Because Apple makes both software and hardware, it rolls out its new software in a quick and efficient manner. Thus every iPhone and iPad that now runs iOS 8 will be able to upgrade to iOS 9, the day it comes out. And unlike previous iOS updates, Apple promises that this time around, the update file won't be as big as your iPhone's available storage. Older iPhones won't all get some features, though. (If your phone doesn't have an NFC chip, you won't be able to use Apple Pay, for instance.)

Android M's compatibility will be more scattered. Because Google can make the software available to its OEM partners, but they are not forced to push the upgrade out to end users. So while Nexus devices are pretty much guaranteed an over the air (OTA) upgrade to Android M, those with phones made by other people have no guarantee. However, if you have a flagship phone from 2014 or 2015, it is most unlikely you won't get the upgrade at some point.

Apple Pay vs Android Pay

Both iOS 9 and Android M share one major new feature: NFC-enabled contactless payments. With Apple Pay and Android Pay, you will be able to use your phone like a

As with the iPhone equivalent, it should be said that developer preview software is really only for, er, developers. Expect bugs and frequent updates, as well as missing features

contactless credit or debit card. (Your wallet will now have a battery life, but at least you have to carry only one device.)

Apple Pay is first out of the blocks. At the time of writing, it was due to hit the UK on 14 July, with support from eight major banks and retailers such as Costa, Boots, Waitrose and the London Underground. Apple Pay first launched in the US on 20 October 2014 and now it is coming here. This despite a new set of regulations from the European Union Council of Ministers that some thought could throw a spanner in the works. (These tighter regulations could require additional authorisation processes.)

Despite this, Apple said that 70 percent of credit- and debit cards in the UK will be supported by Apple Pay at launch. At WWDC 2015, it showed a graphic which name-checked all the major high street banks, with the exception of Barclays. In terms of retailers, the original list includes McDonalds, Lidl, Marks & Spencer, Boots, Waitrose and Costa Coffee.

This is very much a score for Apple Pay, as there is no news as yet as to when Android Pay will make it to the UK. At present all Google has said is that the service will be launching in the next few months, though this will apply to the US rather, with the UK to follow some time later.

At the Google I/O presentation in which Android Pay was announced all of the companies listed as partners – either banks, shops, or mobile phone carriers – were US-based, and there was no mention of a UK or European version. It will happen, but it will take a while. So if contactless payments is your thing, the iPhone is the device for you.

New features

Let's take a look at some of the other new features that may tempt you into the arms of either iOS 9 or Android M. Key features of iOS 9 include a major Siri update and deep-links in search results.

Apple says it has made Siri more proactive. The new features are intended to give iPhone users the same sort of functionality as Android owners already have in Google Now. And this new proactivity isn't only part of Siri but also of search. Spotlight search will display information such as imminent events from the Calendar app, locations nearby that might interest you, boarding passes for flights you'll be boarding that day and more.

Split-screen multitasking is part of iOS 9, too and there's a picture-in-picture mode that allows you to watch videos while you do other things, though these features are iPad only.

As we will see when we discuss Android M features, lots of Apple's competitors offer software-based battery-saving modes for their devices, and Apple will do the same

when it launches iOS 9. Apple says its feature should provide up to three hours of extra use, on top of the extra hour or so you'll get simply from updating to iOS 9, which is more power efficient than iOS 8 (Apple says).

Turning to Android M and we find something similar in what Google calls 'Doze mode'. Doze monitors when the device isn't being used to put it into a deep sleep, which uses less power and can double your battery life – according to Google.

The SystemUI Tuner in Android M allows you to customise the Quick Settings to the ones you want to you the most and in the layout which suits you. Another small but handy change is the ability to uninstall apps straight from the home screen. You now get the choice between simply removing the shortcut/icon or actually uninstalling the app from the device entirely.

Google Now is a great feature of Android and it gets even better in Android M. Now on Tap means you can long press the home button wherever you are you call up Google Now. Better still, you don't need to navigate away from the app you're using and it will already have a good idea of what help you need based on what you've been doing, such as Directions to a specific location after chatting to a friend about meeting up.

We've already got fingerprint scanners on numerous devices so it might not seem like a new feature, but Android M natively supports them. This means you'll be able to use them to authorise payments via Android Pay and confirm Play store purchases. Developers can also use the functionality within their apps.

One annoying thing about Android is that downloading an app requires you to agree to all its permissions, which might include things you don't agree with, such as access to your contacts when it's an endless

runner game. Well Android M is going to change that with the ability to pick and choose which permissions you're happy with for each individual app. You'll also be able to accept or deny a specific permission as and when an app requests it.

If you send links, photos or files to the same contacts, then Android M will start adding them to the Share menu to speed up the process. It's a bit like having favourite contacts when you open the Dialler app to call someone.

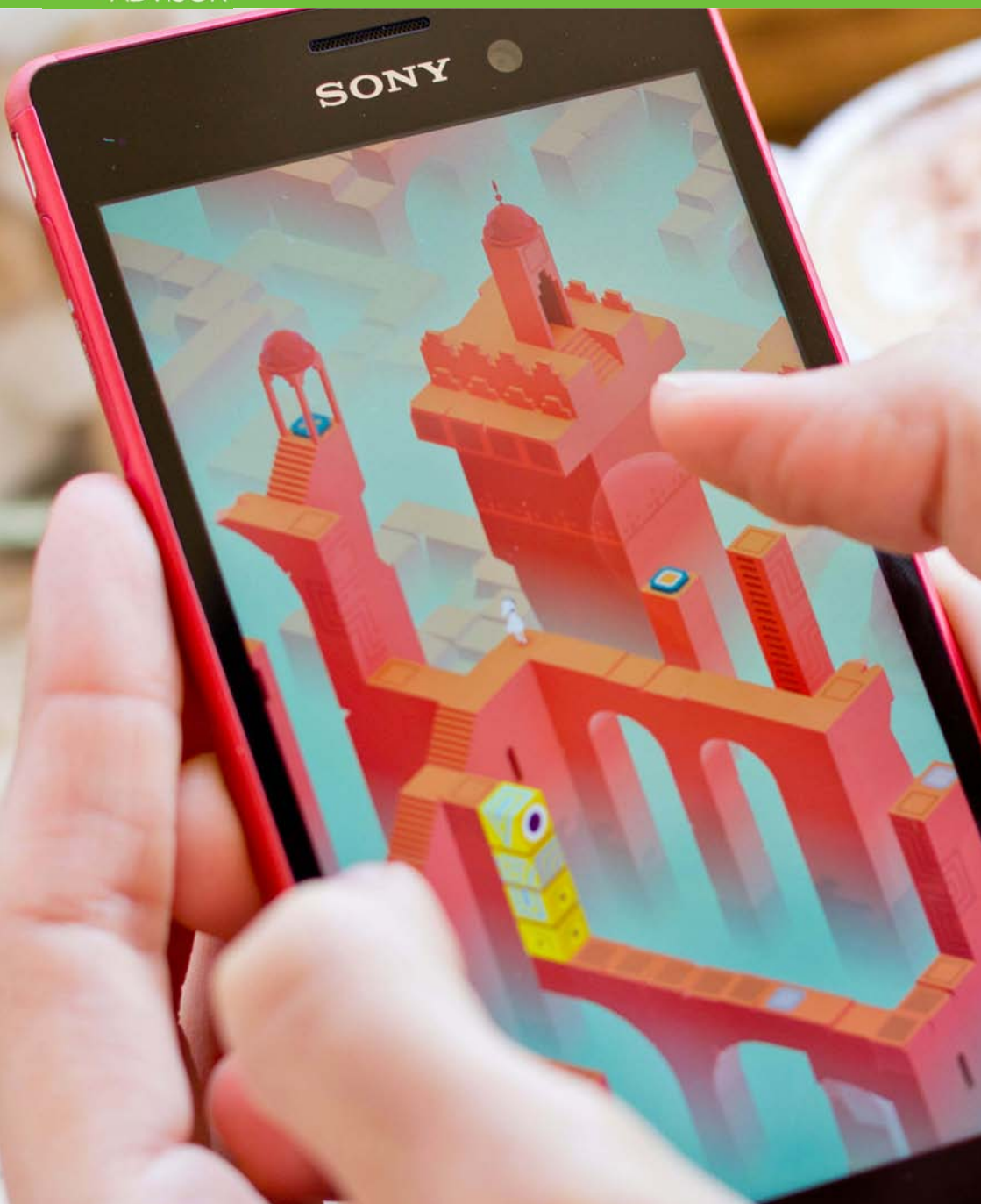
Not only is Do Not Disturb (DND) part of Quick Settings in Android M, the volume control has been tweaked for the better. You can now easily control the volume of calls, notifications and alarms with three separate sliders – simple but effective.

Okay, it's a hardware feature but Android M supports USB Type C, which is good news for future devices – potentially starting with the Nexus 5 2015. You can plug it in either way around, it will charge your device quicker and even allow you to charge other devices.

Verdict

It is too early to make a definitive judgment, but the old truths are likely to remain. If you want ultimate polish, and are prepared to sacrifice your freedom to shop for apps and media outside of Apple's walls, then iOS 9 is for you. It is a prison, but a beautiful, comfortable one. Meanwhile on the Android side of the house the days when Google's platform was hard to use are long gone. But it is probably still fair to say that iOS is a marginally more shallow learning curve for beginners. If you asked me to choose, I would plump for Android, but it really is a personal choice. And Apple Pay being available is a big win for iOS 9. Let's see what the autumn brings.





DATA ROAMING: Avoid data charges abroad

If you're taking your phone on holiday with you, make sure you don't come home to a huge bill

It's holiday season again - at least for parents and school-age children - so it's time to pack your suitcase and go on vacation. Here we gather the best tips to save money making calls and using data abroad when on holiday or business, and list each carrier's roaming charges.

If you've read scare stories of massive mobile data roaming charges - where naïve users have racked up thousands of pounds on their mobile



bills just by browsing the internet or downloading a few files or email attachments – then you might be worried about taking your Android smartphone abroad with you.

Recent reports suggest that the average smartphone user gets through nearly 500MB of data a month. With data roaming charges of £7.50/MB outside Europe you can see how the bills can rapidly add up... Indeed nearly 40 percent of us turn off our phones when we go abroad, and a further 36 percent switching off data roaming.

(Roaming is the word used to describe using your mobile phone on another network for a short period, while still being billed by your existing provider. Your mobile phone number remains the same while roaming. When you are roaming on another network the temporary mobile phone company will bill your usual mobile phone company for calls you make while roaming on their network.)

Data roaming prices have dropped 95 percent since 2010.

New EU roaming charges

Data roaming charges will be abolished within the European Union by June 2017. The ban is preceded by a 14-month interim period, in which telecoms operators can still add reduced surcharges.

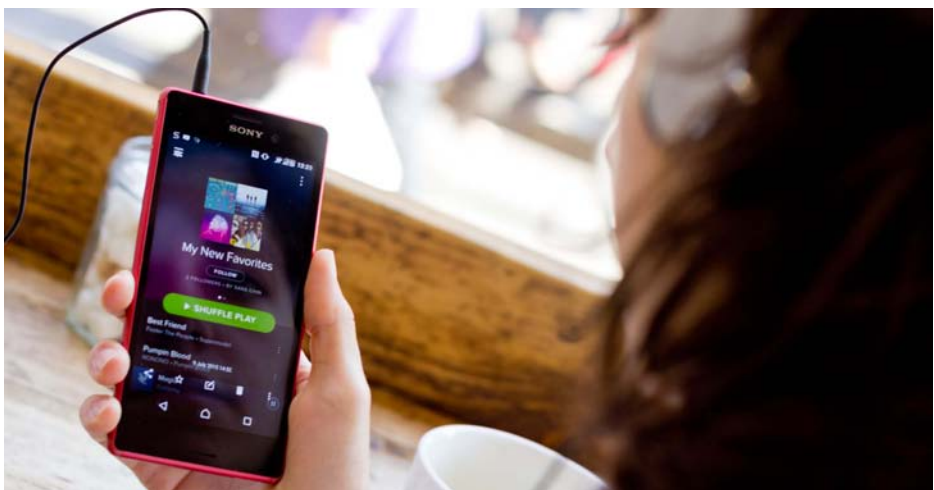
From April 2016 companies will be able to add a surcharge of no more than:

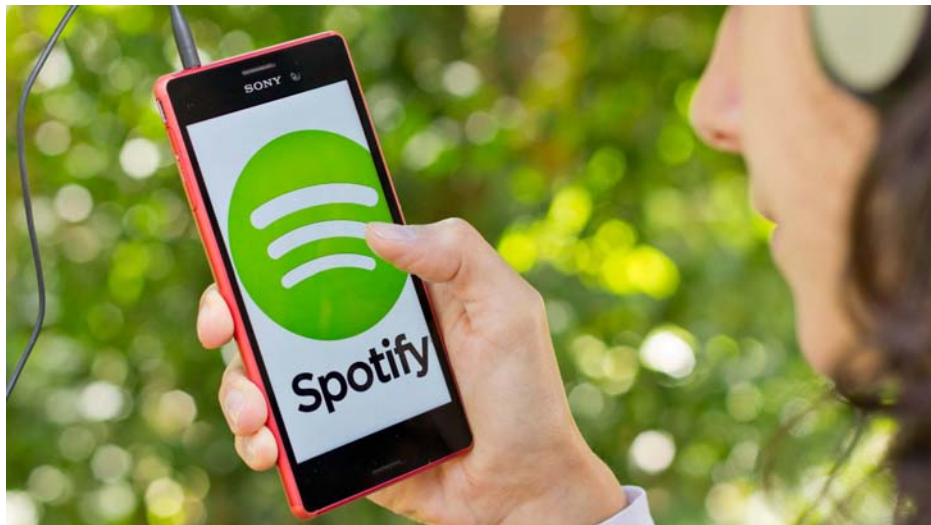
- 3.5p (€0.05) extra per minute for calls
- €0.02 extra per SMS sent
- €0.05 extra per MB of data used

The cap should make EU roaming 75 percent cheaper during this interim period.

The agreement will be presented to the EU's member states between July and December this year for formal adoption.

Before then calling a UK landline or mobile from any EU country will now cost a maximum of 18p per





minute. Receiving a call will cost 4.8p. Sending a text will cost 5p and data will be charged at 19.6p per MB. Previously calls cost 24p per minute, texts were 7p and data was a wallet-walloping 46p per MB.

But you still need to be careful to avoid bank-busting bills when taking your smartphone or 3G-enabled tablet abroad.

O2

O2 currently charges 19.6p per MB within the EU, and £6 per MB outside the EU. Within the EU mobile calls cost 18p/minute. Before travelling to Europe check you have O2 Travel on your Pay & Go account, you can check this by calling customer services on 4445. For the days that you use data in Europe, you will be charged £1.99 for a daily allowance of 50MB, which will automatically end at midnight UK time or stop when you reach your 50MB allowance (whichever comes first). To use

more data, you can text MORETRAVEL to 21300 to reset your allowance for another £1.99 / 50MB. If you don't have Pay & Go O2 Travel on your account text TRAVELON to 21300 to activate; it can take up to 24hrs to be applied to your account. To opt out of O2 Travel text TRAVELOFF to 21300, you will then be charged O2's standard roaming rates. This can take up to 24hrs to be applied to your account.

Making calls in the US to UK costs £1.10/min, and receiving calls 90p/min. Sending texts is 40p per message. Data usage is capped to 50MB (£40) per month. O2's Data Abroad Bolt On increases your standard data limit to 200MB for £120 per month. You can get the Bolt On through My O2.

Vodafone

Vodafone charges 19.8p per MB in the EU; for the rest of the world it's £3 for each MB up to 5MB, then £15 for every 5MB after that. With Vodafone





EuroTraveller you can take your UK minutes, texts and data with you anywhere in its Europe Zone for £3 extra a day. To opt in call 5555 free from your Vodafone mobile or text ADD to 40506 (if you text from abroad, Vodafone will just charge you for a standard text).

You're automatically opted into a monthly spend limit of £42.50 (ex VAT) both in its Europe Zone and Rest of World Zone. Outside of Europe with the Vodafone WorldTraveller you can take your UK minutes, texts and data with you anywhere in its WorldTraveller Zone for £5 extra a day. To opt in, call 5555 free from your Vodafone mobile or text ADD to 40508. Be warned: a smartphone can eat 25MB of data pretty quickly. Making calls in the US to UK costs £1.35/min, and receiving calls £1/min. Sending texts is 35p per message.

Orange

Orange charges 19.8p per MB within the EU, but the highest rest-of-the-world rate is £8 per MB. Orange

lets you add an EU 50MB Daily rate for £3 per day; or £5 for 100MB in the EU. Calling to Europe, Ireland & the Channel Islands and back to the UK costs 18.8p, and 4.9p to receive calls. Texts cost 5.9p to make, but are free to receive. You can get unlimited calls and texts while abroad in selected European countries for £2/day.

Making calls in the US to UK costs £1.20/min, and receiving calls £1.20/min. Sending texts is 50p per message. For the US Orange has a Zone A Roaming Data Bundle of 20MB for £3 a day; or £5 for 100MB.

Three

3 (Three) sadly isn't free. But it looks cheaper than the others in some countries as it charges just 10p per MB in France and the US. Mostly though it's near the now standard sub-20p rate at 19.8p in the EU, and £3 per MB outside the EU. Watch out, though, as prices fluctuate quite wildly according to its website.





3's roaming charges really do depend on which country you're in. France, for example, is a Feel At Home destination, which means you can use your device there at no extra cost. Calls and texts back to the UK and using data will come out of your existing Pay Monthly allowance, if you have one. If you've gone over your allowance, you'll pay special lower roaming rates. In France that's 10p per MB. 3's Feel At Home destinations include: Australia; Austria; Denmark; Finland; France; Hong Kong; Indonesia; Israel; Italy; Macau; New Zealand; Norway; Ireland; Spain; Sri Lanka; Sweden; Switzerland; and the USA. If you've gone over or don't have an allowance calling a UK number from the one of these destinations costs 13.8p/minute. Sending a text costs 4.3p but receiving is free.

With 3's Euro Internet Pass Add-on you can get all-you-can-eat data for £5 a day. The Euro Internet

Pass was designed for browsing, so streaming video or audio content and connecting over a Virtual Private Network (VPN) won't be as good as it is on 3's UK network. Also, using your phone as a Personal Hotspot, calls and texts aren't included. Euro Internet Pass is only available if you've got a Pay Monthly contract and you can only use it in certain countries.

EE

It's a little more complicated with EE. If you're on a 4GEE or T-Mobile plan you can't use your data abroad unless you buy an add-on or Booster. If you try to use the internet on your EE phone or tablet when you're abroad, you're directed to a screen where you can buy roaming data add-ons. With EE you have to buy a roaming add-on before you can





use the internet while you're away. EE has so many roaming add-on options it's confusing. A Euro Data Roaming Add-On costs £3 for 50MB, £5 for 100MB, £12 for 200MB and £25 for 500MB. It all depends on where you are, with EE. If you're in Japan an add-on costs £60 for 50MB. A paltry 10MB costs £12.

As you can see web browsing for a few hours a day over the course of a week could cost you dear - especially outside the EU on EE.

Picture messages

Opening an email that includes a picture taken by a 5-megapixel camera or downloading a three-minute video from YouTube takes about 2MB of data. Vodafone estimates that 20 mobile-friendly web pages uses about 1MB – but remember that the majority of websites are not mobile friendly.

Top 10 tips for avoiding data roaming charges abroad

1 This one's the first tip for a good reason. Where possible only browse or download when using your phone's Wi-Fi connection. Users are not billed for data downloaded over Wi-Fi. The only charge might be if a particular Wi-Fi hotspot charges for access, and you should be informed of that before you can start using the connection.

2 It's OK to check your email, as attachments aren't downloaded until you tell the phone to do so by selecting that attachment. That said, the text in the email is downloaded, so long lists of messages may indeed start to cost more than you'd expect. If you can, think about Tip 1 again, and check email when you're connected to Wi-Fi whenever possible.





3 Check your roaming settings in Settings>Mobile Networks. Also go to Settings>Data usage, and tap on the three dots on the top-right of the screen, then select "Restrict background data". Apps that you aren't currently using will not be allowed to use any data.

Neither do you want your apps to automatically update while you're using mobile data abroad. They should update only when you're connected to a Wi-Fi network, but go to the Play Store app to ensure that the Auto-update apps setting is set to Wi-Fi only.

4 Get a data bundle. You may be able to sign up to a flat-rate or capped data package (aka Bolt On or Add On), where you pay a fixed amount each month for using the mobile internet. Contact your operator to find out what it offers. These can be hard to get your head around. Make sure to check they work for your destination.

5. Go to mobile-friendly websites only. An increasing number of websites now have specific sites where their pages are specially optimised for mobile phone, thus making them lighter on the megabytes. Most mobile websites have a very similar address to the desktop (or 'fat') site. Try replacing the 'www' with 'm' or 'mobile'; or replace the '.co.uk' or '.com' with '.mobi', as with Microsoft's mobile site.

6. Switch SIM card. Another way to avoid high roaming charges is to switch your SIM cards. UK company Dataroom has a range of pay-as-you-go and 30-day plans that it claims could save users “up to 90 percent” on international roaming charges, with pre-paid data SIMs starting at £19.99.

But first the smartphone needs to be “unlocked” from its home network. (Most UK phone networks



lock their handsets to prevent consumers using alternative SIMs, and so force people to pay their high rates.) You can ask your network carrier to unlock your phone, but this isn't always an easy request, as you might have guessed.

Alternatively, there are plenty of small local independent mobile phone stores and online unlocking specialists who can unlock your phone for you. Unlocking your smartphone shouldn't cause any problems either in the UK or abroad.

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**Turn off your phone.
Do you really need to access Facebook
or check the football scores?**

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7 Set up a MiFi. If a phone can't be unlocked you could create your own personal (secure and fast) Wi-Fi hotspot with a MiFi device, which will allow you to run up to five Wi-Fi-enabled devices from that point – ideal for group or family trips abroad. A Mifi is a wireless modem that emits a Wi-Fi signal that devices can connect to, ensuring access to the web for more than one person.

Dataroom sells a Mifi for £89.99 that uses one of the company's data SIMs that work out much cheaper than standard network rates abroad. Set up the Mifi as a wireless hotspot, tell your friends/family the password, and you're up and running.

8 Compress data. The Onavo Extend app promises to give you the ability to do up to five times more with your current data plan

without additional fees. Onavo Extend also provides a breakdown of your mobile data usage, showing you how much data is being consumed by each app and so allowing you to make better informed data usage choices. Onavo Extend compresses your data so that you can do more with your mobile device. It also reduces roaming charges by providing a leaner version of the web.

9. Download maps offline. When you're away from home you actually need data more than you do normally, so the high data charges are doubly frustrating. Step off the plane/train/automobile and the first thing we want/need to do is fire up maps and GPS on our smartphones.

The trick is to download city or area maps before you leave home (you know where you're going, right?) or do so when you get to your hotel wi-fi. You can now do this via a feature in the latest Google Maps app, and you can pre-download maps covering a 10-mile radius. Android users need to enable the "Download map area" feature via the Labs tab in the Google Maps app.

Check that any travel-guide apps – for example, Lonely Planet, Rough Guide, DK Eyewitness, and Time Out guides – you've downloaded include offline maps.

10. Relax. Unless it's a busy business trip, just switch off your phone for a while. Do you really need to check email morning, noon and night, access Facebook, look at Twitter, check the football scores?



REVIEW:

EE Harrier Mini

Replacing the Kestrel and little brother to the Harrier, we see if the Harrier Mini is any good at £99

£99 inc VAT • ee.co.uk • ★★★★★☆

Replacing the Kestrel as EE's own-brand budget 4G phone, the EE Harrier Mini is little brother to the EE Harrier. We see how it stacks up against the competition in our EE Harrier Mini review.

At £99 the EE Harrier Mini offers a cheap entry point for a phone capable of fast 4G data download speeds, but EE isn't the only UK mobile operator to offer its own-brand cheap 4G phone. Vodafone has also recently unveiled its Smart Prime 6, and at £79 it arguably offers better value than the Harrier Mini.

With very similar specifications, including a 1.2GHz processor, 1GB of RAM, 8GB of storage and 8-/2Mp cameras, there's little to differentiate between Harrier Mini and Smart Prime 6. Both are a step up on the Moto E 4G, which is now available for around £89 but has an inferior qHD screen and cameras. The Harrier Mini also boasts EE Wi-Fi Calling, which lets you route calls and texts over Wi-Fi when you're out of range.

The Harrier Mini is identical in design to its bigger brother, the EE Harrier, but with smaller dimensions and a more modest spec. Its performance in our benchmarks was less impressive, but in real-world use it somehow felt faster, and switching between home screens and scrolling through menus is a zippy affair. The camera and some apps still take an age to load, but the Harrier Mini removes many of our misgivings with the Harrier.

Button-placement is a prime example. With the power button placed high up on the left side, and





the volume rocker on the right, single-handedly operating the Harrier could feel a little awkward. Not so with the Mini, and its smaller dimensions mean the positioning is quite comfortable for one-handed use.

The Harrier Mini features the same brushed-metal-effect plastic rear cover with silver EE logo, rear-mounted speaker and gold camera surround as the Harrier. It seems to pull off the plastic look much better, though, and perhaps simply because it is smaller and therefore less in your face.

Half the price of the Harrier, some cost-cutting has been necessary with the Harrier Mini. Not only is the hardware less powerful - although this equates to improved battery life - but the screen has been downsized from 5.2- to 4.7in, and the resolution from full-HD (1080p) to HD (720p). The Harrier's screen is notably sharper, at 424 pixels per inch against the Mini's 312ppi, but the latter really isn't at all bad for a

budget phone - even the iPhone 6 has only 326ppi. The touch-sensitive buttons could have been moved to the large vacant area below the screen to make more space available, but that's a minor quibble.

Storage could be an issue. While the Harrier has a vanilla implementation of Android 5.0 Lollipop, there is a lot of bloatware (which can't be uninstalled) slapped on top, and only 3.69GB of the phone's 8GB storage is available. The Harrier Mini accepts MicroSD, but if you plan to install a lot of apps you may run out of space.

Overall, though, the Mini offers very good value as a cheap 4G phone. Let's take a closer look.

Price and UK availability

At £99 on EE's 4G PAYG network the Harrier Mini offers excellent value, more so than even the very good Moto E 4G, which is now available for around £89 SIM-free. However, with very similar





specifications to the £79 Vodafone Smart Prime 6, you are in effect paying an extra £20 here for Wi-Fi Calling. It's a cool feature if you often find yourself without mobile reception, allowing the phone to automatically route calls and texts over Wi-Fi rather than the mobile network, but if signal problems aren't something you regularly experience then our money would be on the Smart Prime 6.

If you don't want to buy the phone up front, the Harrier Mini is also available free on contracts starting at £14.99 per month, for which you get 500MB of data, 500 minutes and unlimited texts. If you can afford the £99 asking price, though, it will work out significantly cheaper in the long run.

Design and build

As we mentioned in the introduction, the Harrier Mini is very much a smaller version of the EE Harrier. Both are plastic phones, although the manufacturer

(BenQ) has attempted to add a touch of flair with a brushed-metal-effect rear cover. There's also a gold camera surround, shiny silver EE logo and a silver speaker grille at the rear. It pulls off the look much better than its bigger brother, and on looks alone you wouldn't easily guess that this was a £99 phone.

The screen bezels are similarly slim, but as with the Harrier there is a rather large vacant area below the screen. Rather than using this to house the three Android-standard Home, Back and Options buttons, these occupy the bottom row on the screen itself. Even so, with smaller overall dimensions the Harrier Mini is far simpler to operate in a single hand, and even the slightly odd button placement that felt awkward on the Harrier feels natural here.

In the hand the Harrier Mini feels good. The slightly curved rear is a good fit for the palm, and it doesn't creak under pressure. You can prise off this panel to reveal microSD and SIM slots, but it's a shame the battery isn't also removable.





Given that the Harrier Mini costs half the price of the Harrier, some cost-cutting has been necessary. This is seen primarily in the lower-spec core hardware and cameras, but also in the screen. Whereas the Harrier is fitted with a 5.2in full-HD panel, the Harrier Mini has a 4.7in HD variant. Both are IPS panels with good viewing angles and generally realistic colours, but while the Harrier Mini's screen is very sharp for a budget phone you will notice the difference between it and the Harrier. We also found it a little dull without turning up the brightness, but doing so had the negative effect of making colours seem a little washed out. It's a step up on the qHD panel fitted to its predecessor, the EE Kestrel, but in our opinion not as good as the screen fitted to the Vodafone Smart Prime 6, which is larger at 5in, without the device being significantly bigger and heavier.

Hardware and performance

Don't expect to be blown away by this phone's performance, with a lowly 1.2GHz processor and just 1GB of RAM inside. Our benchmarks showed it to be naturally slower than the Harrier, but a little faster than its closest rivals.

Oddly, the Harrier Mini felt faster than the Harrier in real-world use, with no lag when switching between home screens and scrolling through menus, although there is still the same interminable wait when launching the camera or other apps, or even just waking the screen. What feels slow to us, of course, will be quite acceptable to many users - some of the phones that pass through the PC Advisor lab cost six or seven times the price of the Harrier Mini, and are correspondingly faster.

We ran the Harrier Mini through our usual benchmarks, starting with Geekbench 3, which measures processor performance. In the multi-core





component the Harrier Mini recorded 1549 points, making it faster than the Smart Prime 6 (1401), Moto E 4G (1463) and EE Kestrel (1152), although the difference between at least the first three isn't so great that you'll notice a difference. The larger Harrier was faster still, with 2042 points, as you would expect.

Geekbench 3 also includes a battery life test, which we have recently begun using for the phones that pass through our lab. While we don't have battery life scores for the Smart Prime 6, Moto E 4G and Kestrel, we were interested to find that the Harrier Mini performed better in this test than did the Harrier, despite its smaller-capacity battery (2000mAh vs 2500mAh). This is more than likely due to the less demanding hardware. We recorded 2163 points for the Harrier Mini, and just 1424 for the Harrier. Don't expect to get more than a day's usage from that battery before needing a top-up.

You get the same power-management options as with the Harrier, which means you can turn off

Wi-Fi and mobile data when the screen is off, or schedule this to occur only during a set period, such as overnight. If you want people to be able to get hold of you then it's perhaps not the best solution to prolonging battery life, however.

AnTuTu is another new test to the Android Advisor lab, and here the Harrier Mini (21,725) was narrowly beaten by the rival Smart Prime 6 (21,842). The Harrier recorded 29,154 in this test.

Less impressive was the Harrier Mini's showing in SunSpider, which measures JavaScript performance. In this test a lower score is better, and while many Androids now sit somewhere between 800- and

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**In performance the EE Harrier Mini
is beaten by the Vodafone
Smart Prime 6**

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1200ms, the EE Harrier Mini recorded 1880ms. By comparison, the larger Harrier managed 1275ms, while the Smart Prime 6 and Moto E 4G both turned in 1301ms. Even the ageing EE Kestrel did a better job, with 1150ms.

Our final test is GFXBench, within which we use the T-Rex and Manhattan benchmarks to gauge graphics performance. The Harrier Mini recorded 10- and 4fps respectively, which is by no means great, but the phone will be capable of casual gaming. The Moto E 4G did a slightly better job with 13- and 6fps respectively, while the Smart Prime 6 was on par with 9- and 4fps. The EE Kestrel turned in 14fps in a slightly older version of T-Rex.

Connectivity

With the exception of NFC, the Harrier Mini has the same connectivity options as the Harrier. That means you get 802.11b/g/n Wi-Fi and Bluetooth 4.0, plus the promise of Wi-Fi Calling - it's only a shame it wasn't available to the Harrier and Harrier Mini at launch.

Cameras

Photography is another area in which the Harrier Mini sees cutbacks, although its 8Mp rear- and 2Mp front camera setup with LED flash is very good at this price. It's matched by the Smart Prime 6, though, and in our tests its Vodafone rival took the better shot.

HDR is not on by default, although in our experience you will want to switch it on. Our first shot, taken without HDR, was very dark and underexposed on what was a relatively sunny day for the UK. Although the results were much better with HDR, it's clear a lot of detail is still missing.



The EE Harrier Mini can also shoot full-HD (1080p) video from its rear camera, although we found it jerky and struggling to focus, with the same exposure issues as still shots.

The camera app itself is very basic, matching that found on the EE Harrier. Very few camera controls are available, but you do get smile-, voice- and touch-activated capture, plus a countdown timer. You can select Auto, Night or Panorama modes, but no real-time filters are available.

Software

The software setup is identical to that of the Harrier. You get a very plain implementation of Android Lollipop, complete with the Nexus launcher. However, there is a lot of bloatware slapped on top, and none of it can be uninstalled. Additional extras include Lookout, My EE, Amazon Kindle, Local, Music and Appstore, Deezer and Games & Apps. Less than 4GB of the Mini's 8GB of storage was available.

Verdict

We're much keener on the Harrier Mini than we are its bigger brother. While both phones offer very good value, £99 sounds much more appealing than £199, and we prefer the Mini's more compact design. Performance is slower and the screen isn't as good, but you won't get top-end specs from either phone. But as much as we think the Harrier Mini is a great deal, the Vodafone Smart Prime 6 offers better value. It's £20 cheaper and has a larger, better screen, and it seems more adept in photography. Buy the Harrier Mini over the Smart Prime 6 only if you'll benefit from Wi-Fi Calling.



REVIEW:

Ulefone BeTouch

Impossible to fault under £150, the Ulefone BeTouch budget 4G phone ticks all our boxes

£147 • geekbuying.com • ★★★★★

We're finding it difficult to find fault with the Ulefone BeTouch, and that says a lot about a phone that costs less than £150. Find out why in our Ulefone BeTouch review.

Ulefone's BeTouch is a Chinese phone that's available to buy in the UK through Geekbuying for just £147 at the time of writing. Bear in mind that Geekbuying ships the BeTouch from China, so you may also incur import duty. If you do decide to

take the plunge and purchase the BeTouch, you absolutely won't regret your choice.

Not only does this phone offer dual-SIM functionality, but one of those two SIMs supports 4G. And unlike many dual-SIM phones, it doesn't force you to choose between a second SIM and storage expansion - you can boost the BeTouch's 16GB of internal storage by as much as 64GB through microSD, and add a second SIM.

Then again, 16GB is a decent amount of storage for such a cheap smartphone, particularly when you consider that the Ulefone BeTouch is refreshingly free from bloatware. Running an absolutely vanilla version of Android 5.0 Lollipop, we were amazed to find all but one shortcut fit on a single page of the app tray out of the box - and that's the Nexus launcher app tray, of course.

Without the hindrance of bloatware, performance from the 64-bit octa-core MediaTek processor is



The 5.5in screen is of a useful size for viewing media, and its HD (1280x720) resolution is quite acceptable for a sub-£150 phone. This is an IPS screen, protected by Gorilla Glass 3. The Ulefone's display is fully laminated, with rounded edges and very slim screen bezels.

keep down the width), we like the fact the speaker is bottom- rather than rear-facing, preventing sound firing into your palm. The rear cover is removable, but sits flush with the case and doesn't feel at all flimsy or cheap, and it gives access to a removable battery - extra points for Ulefone here.

One of our favourite features of the Ulefone, though, is its fingerprint scanner. We've tested loads of phones with this functionality built-in and, with the exception of the Samsung Galaxy S6 and iPhone, in all cases we've switched off the fingerprint scanner as soon as the novelty has worn off. Swipe-based fingerprint scanners are an absolute pain in the neck, so we were pleasantly surprised to find the BeTouch uses the same touch-based input as the S6 and iPhone. The fingerprint scanner on this phone is not just a cool idea, it's a genuinely usable feature.

And there's more. While Ulefone has left the Android OS alone, it has added some useful screen





gestures. You can double-tap to wake the screen or create your own custom gestures, which launch an app of your choice when you draw a letter on top of the screen in standby.

A 2550mAh battery that can charge up to 35 percent in 15 minutes, dual-band 802.11ac Wi-Fi and 13Mp rear- and 5Mp front cameras complete a brilliant package.

Price & UK availability

The Ulefone BeTouch is a Chinese phone available in the UK through grey-market sites such as Geekbuying. In the UK it was listed on their site for £147.06, but bear in mind that this phone is shipped from China so you may also incur import VAT if purchased from the UK.

Design & build

With a 5.5in screen the Ulefone is a large phone and what we refer to as a phablet - somewhere between

a phone and a tablet. However, the aviation-grade stainless steel frame and aluminium-magnesium mid-frame help keep down the weight to just 160g, while the curved screen edges and slim bezels make one-handed use possible.

Despite the metal frame the Ulefone's rear cover is plastic. It's a removable cover which, usefully, affords access to an also-removable battery and the dual-SIM and microSD slots. It sits flush to the case, which prevents it feeling cheap or creaking.

The 13Mp camera protrudes a little from the rear - it's not something we particularly like, but it is becoming increasingly common with today's ever-slimmer flagships. While the Ulefone BeTouch isn't as skinny as some phones on the market, at 8.6mm it's thin for a budget phone.

Our sample came in metal grey, although the Ulefone BeTouch is also available in silk white. The fully laminated display is prone to picking up fingerprints, but the HD IPS display below looks good. At this size and resolution, the screen is a good fit for viewing media, and the BeTouch displays





realistic colours and useful brightness, with good viewing angles to boot. You can also invert the screen colours if you find the display easier to read in this manner.

The power button and volume rocker are found on the phone's left edge, which can be a bit of a stretch for righthanded users. However, one of several useful gestures allows you to wake the screen with a double-tap, so we didn't find the positioning a problem in real-world use. Options and back software buttons sit below the screen, either side of a home button that incorporates a fingerprint scanner.

The beauty of this fingerprint scanner, and something we haven't been able to say about any of the fingerprint scanners found on rival cheap Chinese phones, is that it works. Using touch-rather than swipe input, we found the BeTouch recognised our fingerprint every single time, and

that means we're actually likely to use it. It's fast, too, recognising your fingerprint in a fraction of a second, even when your hand is wet.

Six small holes on the BeTouch's bottom edge allow sound to escape from the built-in speaker. It's a preferable approach to a rear-mounted speaker that can fire sound into your palm, although front-facing would be even better.

Hardware & performance

With a 1.7GHz octa-core processor from MediaTek, 3GB of RAM and Mali-T760 MP2 graphics inside, the Ulefone BeTouch is a capable smartphone. In real-world use we found it very smooth, and this is no doubt thanks to not only the hardware but a lack of bloatware slowing it down.

We ran the Ulefone BeTouch through our usual benchmarks, and the results make for pleasant reading - particularly in Geekbench 3, which





measures processor performance. In the multi-core component of this test the BeTouch scored a staggering 3817 points. And that really is super-duper fast, beaten only by the fastest Android phones we've ever tested, the Samsung Galaxy S6 and S6 Edge. (And the UMI eMax, although the Ulefone shows better performance in other tests.) In the single-core component the Ulefone scored 794 points, which places it in between the UMI eMax and UMI Hammer.

In SunSpider, which measures JavaScript performance, the Ulefone BeTouch did a good job for an Android phone, with this benchmark's scoreboards dominated by the various iPhone models. We ran SunSpider both on the browser that came preinstalled on the Ulefone, in which it scored 915ms, and in Chrome, which we use to ensure a fair test across all Android phones, in which it scored 975ms. In SunSpider a lower score is better, which

means it actually did a better job here than did the aforementioned S6 and S6 Edge.

GFXBench is used to measure graphics performance, and the Ulefone recorded 25fps in T-Rex and 12fps in Manhattan. Both are very good scores for a phone at this price point, and in line with flagship phones such as the LG G4 and Nexus 6.

Two new tests we've recently begun using in the Android Advisor lab and for which we currently have few scores to compare are AnTuTu and the battery life test built into Geekbench 3. In AnTuTu the BeTouch recorded 41,661 points, which is a little below Ulefone's claims of 45,000 points-plus,

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In Geekbench 3 the Ulefone really is super-duper fast, beaten only by the fastest Android phones we've ever tested

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and put its performance somewhere between the Samsung Galaxy S5 and Nexus 5.

In Geekbench 3's battery test the Ulefone recorded 2540 points (04:38:40), which is a little behind the LG G4. Arguably, though, even the best phone battery will quickly be drained by a heavy user, so how fast the phone can recharge its flat battery is also important. Using the included charger the BeTouch can reach 35 percent in just 15 minutes. This is a two-pin plug, but Geekbuying will also supply a UK adaptor in the box upon request.

Also pleasing is the fact the Ulefone BeTouch's 2550mAh battery is removable, which means you could carry a spare or a power bank.

Connectivity

Well, we've found our first cause for complaint with the Ulefone BeTouch: it doesn't support NFC. (Do we care? No we do not.)

In other respects, the Ulefone BeTouch has all connectivity bases covered, with dual-band 802.11ac Wi-Fi, Bluetooth 4.0, GPS, A-GPS and GLONASS and OTG. Plus, not only is it dual-SIM (dual-standby), with one slot supporting a full-size card and the other Micro-SIM, it supports 4G. And, unlike some Chinese phones, wireless updates are available, making it easy to install software updates.

Cameras

Slapped on the back of the Ulefone BeTouch is the same 13Mp Sony Exmor IMX214 camera that is found on the rear of many Chinese phones. That's not a bad thing, though, and the photos it takes are much better than you have any right to expect at £150.



The camera is quick to focus once you've launched the app, although a dedicated camera button would make doing so even faster. There's a dual-LED flash and the Ulefone stretches to ISO 1600 for better low-light pictures, while the rear camera also supports up to 4K video recording at 30fps and has a tracking autofocus for capturing moving objects.

Around the front is a 5Mp selfie camera with an 80-degree wide-angle lens.

Both cameras support real-time application of filters, plus various modes including picture in picture, live photo, motion tracking, beauty, panorama and multi-angle. You can trigger a shot with a gesture, smile or voice command, although



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Ulefone's BeTouch is an unrivalled deal at £147. It's genuinely difficult to fault at this price

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in doing so the camera switches off its anti-shake feature. Face detection is also supported.

HDR is not automatic, but we found photos look better with it turned on.

Software

The Android Lollipop OS preinstalled on this phone is exactly as Google intended, and that makes a refreshing change. There is zero bloatware preinstalled, and we found all but one of the shortcuts fit on a single page of the Nexus launcher app tray - amazing.

The only changes Ulefone has made are for the better: there's the aforementioned option to invert screen colours in the Quick settings drop-down, plus you can set custom gestures that allow you to launch an app of your choice from standby simply by drawing a letter on the screen. The ability to wake the screen with a double-tap also eases managing this phablet in a single hand.

Verdict

Ulefone's BeTouch is an unrivalled deal at £147. It's fast, it's dual-SIM with 4G connectivity, it has a working fingerprint scanner for security, the screen is large and with an HD resolution plenty crisp enough for the money, and there is absolutely no bloatware. A few minor quibbles aside, it's genuinely difficult to fault this phone at this price.



REVIEW:

UMI eMax

The most powerful UMI phone we've seen, the eMax is bigger and better than all the rest - but just as affordable

£115 • coolicool.com • ★★★★★☆

We've been impressed by what we've seen from Chinese phone maker UMI so far, having recently reviewed both the Zero and Hammer. This UMI eMax is an altogether more powerful beast, with an octa-core processor, a standout 5.5in full-HD screen and a massive 3780mAh battery that can even serve as a power bank for other phones. Find out more in our UMI eMax review.

The best bit about the UMI eMax is its price, and right now it's available for just £115 from Coolicool.com. That's amazing value for money. Bear in mind that this phone ships from China, so you may also incur import duty when purchased in the UK.

While the UMI eMax's graphics performance sits in line with UK-sold budget phones, its processing and battery performance is spectacular, beaten in our benchmarks only by the best Android phones in the land, the Samsung Galaxy S6 and its brother the S6 Edge. While benchmarks can be cheated, and its AnTuTu score isn't quite so high, the eMax shows no sign of lag in real-world use, and even the Camera app launches relatively quickly.

The eMax isn't as good-looking as the metal-framed Hammer and Zero, but for a phablet it's reasonably attractive. Legends for the three Android-standard home, back and options buttons are always visible below the screen, and the camera juts out at

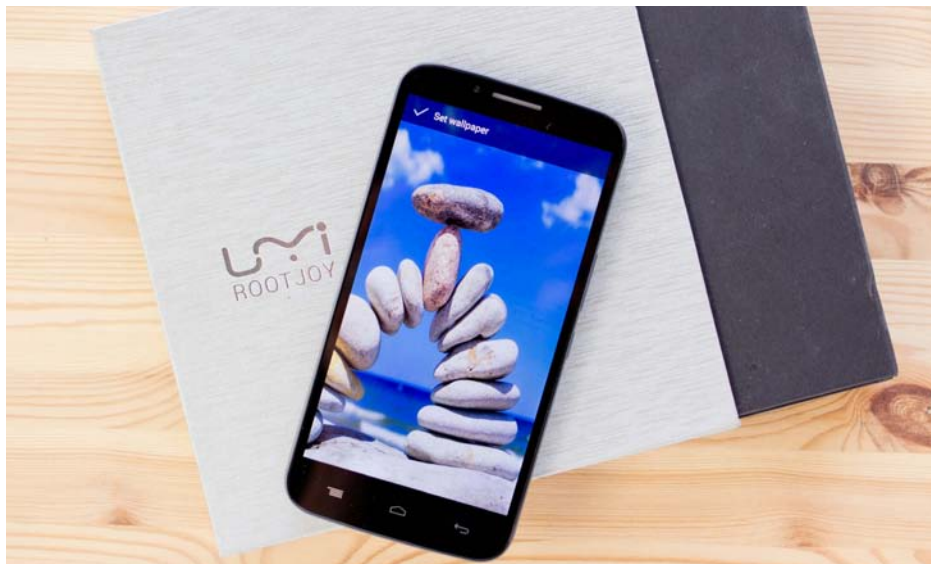




the rear very much like on the Samsung Galaxy S6. There's also a rear-mounted speaker, although the size of the phone means it is unlikely to fire sound into your palm.

Available in grey or silver, the eMax is a plastic phone with a subtle brushed-metal-effect finish on the rear. This is not removable, with trays at the left and right edges for adding two 4G SIM cards and a microSD card. But with 16GB of storage as standard and very little bloatware preinstalled, you may find there's enough space for your files and apps without expansion.

You get the standard 13Mp rear- and 5Mp front camera setup. There's support for smile-, gesture, and voice-activated capture, real-time application of filters, plus all the usual camera modes, including HDR, picture-in-picture, live photo, motion tracking, panorama and multi-angle capture. The front camera also has a Beauty mode.



UMI's eMax is sold rooted, but don't let that put you off. With Android 4.4 KitKat preinstalled out of the box, and an upgrade to 5.0 Lollipop available, the eMax in common with the Hammer also supports Rootjoy. This is a program that you download to your Windows PC or laptop, then plug in your phone to quickly install updates, flash a new ROM of your choice (including such things as MIUI6), install a custom UI or back up your data.

The interface is largely plain KitKat, but you do also get the customisable gestures and double-tap to unlock feature so often found on Chinese phones. With the phone in standby mode, drawing a letter onscreen will launch an app of your choice.

While the eMax lacks some advanced features, such as the fingerprint scanner found in the £147 Ulefone BeTouch, at £115 you get a great deal for your money. Let's take a closer look.

Price and UK availability

Our UMI eMax sample was shipped from Coolicool.com, where it costs £115.59. Coolicool is based in China, which means you may also incur import duty when shipping items to the UK.

Design & build

Unlike the Zero and Hammer before it, the UMI eMax is a relatively plain-looking, unassuming device. With a 5.5in screen this is a phablet, but it's still just 148g and with slim bezels reasonably easy to operate in a single hand.

From the front the eMax is marred only by the always-visible legends for the Home, Back and Options buttons. Switch on the screen, though, and you instantly don't care: with a full-HD resolution this IPS panel is crystal clear, and as sharp as many flagship Androids at 401ppi. You absolutely should not expect a full-HD screen at this price. Colours are





bright and realistic, even with the brightness turned down, and viewing angles are very good.

From the rear the eMax is less attractive, but by no means ugly. We're confused by the Chinese-English translation in the eMax's marketing materials, which states: "The one piece art of frame battery cover is made by Polycarbonate with 200 times processing brushed stainless steal [sic]." This phone looks and feels very much like a plastic device to us, although there is a subtle brushed-metal effect to the rear.

The rear cover is non-removable, with side-loading trays for the two SIM slots and microSD card. A power button and volume rocker are also found on the eMax's right side, while there's a headphone jack at the top and Micro-USB charging port at the bottom. Despite its plastic feel the eMax feels very sturdy - not as tough as the Hammer, but tough nonetheless.

We're not so keen on the way the phone's 13Mp camera sticks out at the rear, but this is becoming increasingly common in today's ever-thinner phones. And this is one of them: at 7.9mm thick, you'd never guess the eMax costs just £115. As is the case on the Samsung Galaxy S6, though, this camera is centred and squareish, so it won't rock nearly so much when placed flat on the table as, say, the iPhone 6.

Also at the base of the rear is a speaker grille. Usually this is a no-no for us, muffling sound as it fires it into your palm, but the phablet dimensions stopped this being a problem in our testing.

Hardware & performance

Inside the UMI eMax is a 1.7GHz MediaTek MTK6752 octa-core 64-bit processor, 2GB of RAM, 16GB of storage and an ARM Mali-T760 MP2 graphics processor. We have seen this setup before, such as in the Kingzone Z1, while the Ulefone BeTouch





adds an extra gig of RAM. But the eMax appears to have put its hardware to the best use - at least if our benchmarks are to be believed.

And therein lies the catch: benchmarks can't always be trusted. Nevertheless, we found the UMI eMax smooth and responsive in real-world use, with no sign of lag.

In Geekbench 3.0 the UMI eMax gave its standout performance. We use this test to measure processing performance, but have also recently begun including results from its battery life test. The eMax aced both - and the latter is certainly no surprise, given the capacious 3780mAh cell found inside. With OTG support (and an adaptor included in the box), the eMax can even be used as a power bank to charge another phone - it will fill an iPhone 6 twice, says UMI. So, you can expect several days' life with normal use.

The reigning champions of our Geekbench 3 tests are the Samsung Galaxy S6 and S6 Edge, with the

S6 scoring 4438 points in processing- and 4136 in battery performance, and the S6 Edge 5076- and 4011 points. The UMI eMax got incredibly close to those scores performance, with 4101 points in processing-, and 4006 in battery performance. By comparison, in processing performance the UMI Hammer recorded 2203 points and the Kingzone Z1 3689. We also ran the Kingzone through the battery life test, and it scored 3074 points.

AnTuTu is another new test to the PC Advisor lab, and with few results with which to compare devices for now it's rather difficult to understand what the scores are telling us. However, through AnTuTu's own database we can see that the UMI eMax's 41,799-point score is faster than both the Nexus 5 and LG G3, but slightly below last year's flagship Galaxy S5. It also performed better than the UMI Hammer (32,506) and Ulefone BeTouch (41,661).

Graphics performance in GFXBench showed something to be desired, and rather than delivering





scores to match the flagships the UMI eMax put in a performance similar to that of other budget- and mid-range phones, including the EE Harrier, Sony Xperia M2 and Moto E 4G. Casual games will be easily playable on the eMax, but scores of 15fps in T-Rex and 6fps in Manhattan are nothing to shout home about.

Our final test is SunSpider, which measures JavaScript performance. We ran this test both in the preinstalled browser, in which it recorded a very good 734ms, and in Chrome to ensure a fair test across Android phones. Its Chrome score of 840ms is still very good (lower scores are better in this test), and in line with the likes of the Honor 6, Sony Xperia Z3 and Samsung Galaxy S5.

Connectivity

Connectivity-wise there's support for dual-band 802.11b/g/n Wi-Fi and Bluetooth 4.0. For positioning

you get both GPS and A-GPS with EPO, with the separate GPS sensor claimed to offer faster results and improved accuracy.

NFC is missing, but you do get HotKnot, which is MediaTek's equivalent. This lets you share files and web pages, play games and more with other HotKnot-connected phones.

OTG support is perhaps more useful in the UMI eMax than it is other Androids, given the large-capacity battery. You could use the eMax as an emergency charger for powering other devices... or you could be selfish and keep that juice to yourself, and tell your friends to buy themselves power banks. OTG also lets you hook up external storage devices, and an adaptor is handily supplied in the box.

The UMI eMax is a dual-SIM phone that operates in dual-standby mode, accepting two Micro-SIMs. It's a 4G phone, which is very good at this price, but if you're buying the eMax in the UK check



that it will work on your network first. The eMax operates on GSM 850/900/1800/1900MHz, WCDMA 900/1900/2100MHz and 4G-FDD 800/1800/2600MHz.

Cameras

As with virtually every Chinese phone we see, the UMI is fitted with a 13Mp camera at the rear, with f/2.2 aperture and an LED flash, and a 5Mp selfie camera with f/2.2 aperture and 1.12um pixels.

The primary camera focuses in 0.3 seconds, and we found it did a decent enough job when we switched on HDR, although some detail is missing when you zoom in.

Real-time filters are available at the composition stage for both cameras, and both also benefit from a Beauty mode and Picture-in-picture. Switch to the main camera and you get more options, including HDR, live photo, motion tracking, panorama and



multi-angle capture. There's support for smile-, gesture, and voice-activated capture, too, plus a 40-shot burst mode.

Note that the full 13Mp is available only in 4:3 format; in the phone's default 16:9 stills are 9.5Mp.

Software

Given that the UMI eMax is sold rooted and with support for Rootjoy, there's no need to stick with the Android 4.4 KitKat OS preinstalled out of the box unless you want to. An upgrade to Lollipop is available, or you can load up Rootjoy on a Windows PC or laptop, hook up your phone and then install a custom OS of your choice. Rootjoy also lets you load updates, install a custom UI and back up your data.

Stick with KitKat, though, and you won't be disappointed. This is a fairly stock implementation of the Android OS, with full access to Google Play and Google apps. Very little bloatware is preinstalled, and you may find additional apps such as ToDo and File Manager useful.

In common with the majority of Chinese phones we review, customisable gestures are present. Not only can you double-tap to wake the screen, but you can draw a letter onscreen in standby mode to automatically launch an app of your choice.

Verdict

UMI's eMax offers superb value for money. It's not as good-looking as other UMI phones we've reviewed, but the eMax has a big and bright full-HD screen for enjoying media and more, and showed very capable performance in the majority of our benchmarks. Enthusiasts will appreciate the Rootjoy support.



REVIEW:

Xiaomi Wireless Gamepad

Get properly stuck in to driving-, shooting- and action games with this Xiaomi wireless controller

£14.82 • gearbest.com • ★★★★★☆

With increasingly powerful hardware and better screens than ever, Android phones and tablets are fast becoming the go-to devices for portable gaming.

There's nothing inherently wrong with using a touchscreen for gaming on an Android phone or tablet, and in most games the onscreen controls will be placed so as not to obscure the action.

But when it comes to driving-, shooting- and

action games, a proper controller makes it much easier to get stuck in.

Wireless controllers for Android are nothing new, but they recently caught our eye when Xiaomi decided to join the party. Its Wireless Bluetooth Gamepad is a mash-up of an Xbox One and a PS4 controller, very Xbox in its design and key button placement, but its triggers are PlayStation all over.

That's not a bad thing. The Xiaomi Wireless Bluetooth Gamepad looks good, at 220g it has a nice weight to it and, on the whole, it feels well made and durable. Run your finger across the seam between top and bottom and you will feel a slight rough edge, but it's not a major flaw. Severe pressure tests suggest the buttons will stand up to more than a million times normal use for at least five years, according to the company.

Xiaomi has carefully considered the design of each control. There are grippy rubber tops to the





left- and right thumb sticks, but a smooth glossy finish below that helps them move effortlessly in any direction. The ABXY buttons and D-Pad feature this same smooth, glossy finish, and the latter uses four positioning balls for better accuracy when rotating 360 degrees. Even the triggers are designed with comfort in mind, with L2 and R2 extended and curved outward, allowing your fingers to rest comfortably when not in use, and get a good grip when required.

Dual vibration motors (light on the left and heavy on the right) and a Bosch G Sensor with three-axis gravitational acceleration lend something to gameplay you just don't get when interacting via a phone or tablet's touchscreen. We also found this plastic controller won't slip from even the sweatiest of hands mid-action, and neither will it retain a gamer's fingerprints.

A key difference to the Xbox One controller is the three buttons that sit in the centre of the Xiaomi Gamepad. You'll find Back and Menu buttons, plus a Mi button, which is used to pair the GamePad with an Android device. We also found two slots at the top and one at the rear that seem to suggest you can attach a bracket for holding your phone or tablet; however, we could find no such accessory online.

The Xiaomi GamePad connects over Bluetooth 3.0 and, although we'd prefer to see energy-saving Bluetooth 4.0 or 4.1, we found the controller worked flawlessly with our Samsung Galaxy S6. Contrary to what we've read about the Xiaomi Gamepad online we were unable to pair it with an iPhone or iPad, but the controller works fine with Android phones and tablets, plus Android TVs and Android set-top boxes. You can pick it up on a Windows PC or laptop and Mac, too.





A flaw to the Xiaomi Gamepad is its lack of a rechargeable battery. Rather than recharging it over Micro-USB, you must use two AA batteries. We found two in the box, but of the standard- rather than rechargeable variety (rechargeable batteries are supported, but you'll need to supply your own). Even so, Xiaomi claims its Gamepad offers one-year battery life in standby mode, which the controller will enter after five minutes of inactivity.

Few Xiaomi products are officially sold in the UK, and this is one of them. We received our review sample from GearBest, which lists the Xiaomi Gamepad for a tiny £14.82 - that's excellent value.

We've never had any problems receiving goods from GearBest. More of an issue for us was the fact the instructions are written entirely in Chinese (understandably, of course). So here's what you need to know if you decide to pick up a Xiaomi Wireless Bluetooth Gamepad.

First, the Wireless Bluetooth GamePad will not work with every game installed on your Android phone or tablet, although many are available on Google Play that are compatible. We referred to AndroidGamepadGames.com for a handy list of what might work, then loaded up Asphalt 8 and Beach

“

Xiaomi claims that its Gamepad offers one-year battery life in standby mode

”

Buggy Racing - both heaps more fun with a wireless gamepad than a touchscreen.

Second, in order to get started using the Xiaomi Wireless Gamepad you must insert the batteries then press the Mi button. When it blinks white you should be able to pick it up in your phone or tablet's Bluetooth settings; pair with and connect to the Xiaomi, then simply load up a compatible game to begin playing.

Third, as with all gamepads the controls will differ slightly among games. We found in each game we tried there was a handy tutorial that explained which buttons, sticks and triggers to push or pull to get us to the finish line.

Verdict

It won't be for everyone, but if you're a keen mobile gamer the Xiaomi Wireless Gamepad will enhance your gaming experience on an Android phone or tablet. At £14 it's incredibly good value.



Review:

Xiaomi Power Bank

The new 10,000mAh bank from Xiaomi is one of the best we've seen yet. Here's why

£11.56 • geekbuying.com • ★★★★★

Xiaomi's 10,000mAh Power Bank is one of the best we've seen, and not just in a long time - ever. Oozing style with an elegant and highly portable aluminium-alloy design, the Xiaomi packs useful capacity and still represents extraordinary value. Find out more in our Xiaomi power bank review.

When we first took the Xiaomi power bank out of its box we were confused. As is standard with

Xiaomi products, all the writing on the box and in the supplied quick setup guide was in Chinese. We thought we were getting a 10,000mAh power bank, yet this thing is closer in size to the 6,000mAh Zendure A2.

And, indeed, the specs mentioned something about 6250mAh. But we hadn't been duped. Unlike many other power bank manufacturers we've encountered, Xiaomi is completely transparent with the fact that the entire 10,000mAh capacity will not be available to power your phone or tablet. Most power banks will lose between 30- and 35 percent of their battery capacity through heat generated and voltage conversion, so we wouldn't expect to get any more than 7,000mAh from a 10,000mAh bank.

We think Xiaomi has been somewhat over-cautious with this 6250mAh rating in any case. The hardware inside has been optimised for increased efficiency and durability, which Xiaomi claims is up to 93 percent. We saw two full charges for our



Samsung Galaxy S6 (2550mAh battery), and were still able to get a Ulefone BeTouch (also 2550mAh battery) to 75 percent.

This isn't the only thing Xiaomi has taken extra care over in designing its Xiaomi power bank. The fact that it has managed to squeeze so much power into such a compact 91x60x22mm design (725Wh/L) means this is the first 10,000mAh power bank we've seen that we'd happily slip into a pocket rather than a bag. No power bank makes a better compromise between portability and capacity.

We can't fault the design and build quality either, and if it weren't for the Micro-USB- rather than Lightning input and supplied flat white cable, the Xiaomi would look right at home in an Apple factory.

Available in silver, gold or rose anodised aluminium alloy, the Xiaomi power bank is CNC-milled with what the company claims is MacBook Pro-standard surface processing. This elegantly curved chassis features a sweatproof and anti-corrosion surface and although no carry case is provided (we've found silicone cases available to buy on Amazon for £5.79), you're unlikely to need one - the Xiaomi power bank is shatterproof and resistant to collision.

The safeguards extends to the Texas Instruments/MPS-designed circuitry inside, and the smart-control chips feature nine layers of protection, covering everything from temperature resistance





and short-circuit protection to input- and output overvoltage. The indented power button at one end can also act as a reset button when required, for the power bank itself will automatically begin charging when you attach a phone or tablet.

With a single USB output you'll be able to charge your phone or tablet, rather than both at once, but this helps to keep down size. Plus we like the fact the Xiaomi supports passthrough charging, which means you can charge both it and an attached device at once.

With a 10W Micro-USB input, using a similarly specified mains adaptor you should be able to refill the Xiaomi in roughly 5.5 hours. The USB output is also well specified, fast at 10.5W and offering automatic power adjustment to suit the device.

In terms of value, the Xiaomi power bank is unbeatable, and you'll pay twice the price for most 10,000mAh power banks. Xiaomi power banks are available to buy in the UK, for example through Amazon for £14.66, but Geekbuying offers a much cheaper deal at £11.56 with free shipping.

Verdict

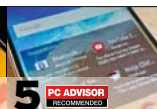
Perfectly balancing portability with capacity, the Xiaomi power bank's feature list and specification is also much bigger than you'd expect. Brilliantly designed, the Xiaomi 10,000mAh Power Bank offers extraordinary value.

Best smartphones


1
PC ADVISOR
RECOMMENDED

2
PC ADVISOR
GOLD

3
PC ADVISOR
RECOMMENDED

4
PC ADVISOR
GOLD

5
PC ADVISOR
RECOMMENDED

	Samsung Galaxy S6	Sony Xperia Z3 Compact	LG G4	LG G3	HTC One M9
Price	£349 inc VAT	£349 inc VAT	£500 inc VAT	£479 inc VAT	£579 inc VAT
Website	Samsung.com/uk	Sony.co.uk	Lg.com/uk	Lg.com/uk	HTC.com/uk
Launch date	Apr 15	Sep 14	May 15	May 14	Mar 15
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)	Android 5.0 Lollipop	Android 4.4 KitKat	Android 5.1 Lollipop	Android 4.4 KitKat	Android 5.0 Lollipop
Processor	2.1GHz Exynos 7420	2.5GHz Snapdragon 801	Snapdragon 808 six-core	2.5GHz Snapdragon 801	Snapdragon 810 octa-core
RAM	3GB	2GB	3GB	2GB/3GB	3GB
Storage	32/64GB	16GB	32GB	16GB/32GB	32GB
MicroSD support	No	Up to 128GB	Up to 128GB	No	Up to 128GB
Graphics	Mali-T760 GPU	Adreno 330	Adreno 418	Adreno 330	Adreno 430
Screen size	5.1in	4.6in	4.5in	5.5in	5in
Screen resolution	1440x2560	720x1280	1440x2560	1440x2560	1080x1920
Pixel density	577ppi	319ppi	538ppi	534ppi	441ppi
Screen technology	Super AMOLED	IPS	IPS	IPS	IPS
Front camera	5Mp	2.2Mp	8Mp	2Mp	4Mp (UltraPixel)
Rear camera	16Mp, LED flash	20.7Mp, LED flash	16Mp	13Mp, LED flash	20Mp
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Nano-SIM	Nano-SIM	Micro-SIM	Micro-SIM	Nano-SIM
Dual-SIM as standard	No	No	No	No	No
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth	Bluetooth 4.1	Bluetooth 4.0	Bluetooth 4.1	Bluetooth 4.0 (aptX)	Bluetooth 4.1 (aptX)
GPS	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass
NFC	Yes	Yes	Yes	Yes	Yes
USB OTG	Yes	Yes	Yes	Yes	Yes
Extra features	Heart-rate sensor, fingerprint scanner	Waterproof, PS4 Remote Play	24-bit/192kHz audio, rear key	24-bit/192kHz audio, rear key	BoomSound speakers
Geekbench 3.0 (single)	1347	Not tested	Not tested	Not tested	1160
Geekbench 3.0 (multi)	4438	2800	3513	2465	3378
SunSpider	1048ms	944ms	715ms	959ms	867ms
GFXBench: T-Rex	30fps	41fps	25fps	20fps	50fps
GFXBench: Manhattan	14fps	26fps	9fps	Not tested	24fps
Battery	2550mAh, non-removable	2600mAh, non-removable	3000mAh removable	3000mAh, removable, Qi	2840mAh, non-removable
Dimensions	143.4x70.5x6.8mm	64.9x127x8.6mm	64.9x127x8.6mm	75x146x8.9mm	70x145x9.7mm
Weight	138g	129g	155g	149g	157g
Warranty	1 year	2 years	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PC2KOVO	TINYURL.COM/NBBUY82	TINYURL.COM/NBBUY82	TINYURL.COM/OA76T73	TINYURL.COM/PUS2XEJ

Best budget smartphones	    				
	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Motorola Moto E 4G 2015	Vodafone Smart Prime 6	EE Harrier Mini	Motorola Moto G 3G 2014	Motorola Moto G 4G 2014
Price	£109 inc VAT	£79 inc VAT	£99 inc VAT	£140 inc VAT	£117 inc VAT
Website	Motorola.co.uk	Vodafone.co.uk	EE.co.uk	Motorola.co.uk	Motorola.co.uk
Launch date	Feb 15	June 15	June 15	Sep 14	May 14
Build rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★★
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★★
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
OS (out of box)	Android 5.0 Lollipop	Android 5.0.2 Lollipop	Android 5.0 Lollipop	Android 4.4 KitKat	Android 4.4 KitKat
Processor	1.2GHz Snapdragon 410	1.2GHz Snapdragon 410	1.2GHz	1.2GHz Snapdragon 400	1.2GHz Snapdragon 400
RAM	1GB	1GB	1GB	1GB	1GB
Storage	8GB	8GB	8GB	8GB	8GB
MicroSD support	Up to 32GB	Up to 64GB	Not stated	Up to 32GB	Up to 32GB
Graphics	Adreno 306	Adreno 306	Not stated	Adreno 305	Adreno 305
Screen size	4.5in	5in	4.7in	5in	4.5in
Screen resolution	540x960	720x1280	720x1280	720x1280	720x1280
Pixel density	245ppi	294ppi	312ppi	294ppi	326ppi
Screen technology	IPS	IPS	IPS	IPS	IPS
Front camera	0.3Mp	2Mp	2Mp	2Mp	1.3Mp
Rear camera	5Mp	8Mp	8Mp, LED flash	8Mp, LED flash	5Mp, LED flash
Video recording	720p	1080p	720p	720p	720p
Cellular connectivity	4G	4G	4G	3G	4G
SIM type	Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM
Dual-SIM as standard	No	No	No	Yes	No
Wi-Fi	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	GPS, A-GPS, Glonass	A-GPS	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
NFC	No	No	No	No	No
USB OTG	No	Yes	Yes	Yes	Yes
Extra features	Double-twist launches camera, lockscreen alerts	FM radio	Wi-Fi calling	Stereo speakers	None
Geekbench 3.0 (single)	464	464	Not tested	340	334
Geekbench 3.0 (multi)	1463	1401	1549	1144	1168
SunSpider	130fms	130fms	1880ms	1526ms	1504ms
GFXBench: T-Rex	13fps	9.4fps	10fps	11fps	11fps
GFXBench: Manhattan	6fps	3.8fps	4fps	4fps	Not tested
Battery	2390mAh, non-removable	N/S, non-removable	2000mAh, non-removable	2390mAh, non-removable	2070mAh, non-removable
Dimensions	66.8x5.2x12.3x129.9mm	141.65x71.89x9mm	138x67.9x9.5mm	71x142x11mm	66x130x11.6mm
Weight	145g	155g	124g	155g	143g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/q7o9nXR	TINYURL.COM/q5dsNHE	TINYURL.COM/pXtR0H4	TINYURL.COM/OAe6AH5	TINYURL.COM/ONOLU77

Best phablets



	1 PC ADVISOR RECOMMENDED	2	3 PC ADVISOR GOLD	4 PC ADVISOR GOLD	5
	Samsung Galaxy Note 4	LG G4	LG G3	OnePlus One	Google Nexus 6
Price	£599 inc VAT	£500 inc VAT	£479 inc VAT	£229 inc VAT	£499 inc VAT
Website	Samsung.com/uk	Lg.com/uk	Lg.com/uk	Oneplus.net	Play.google.com
Launch date	Sep 14	May 15	May 14	Jul 14	Oct 14
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★☆
OS (out of box)	Android 4.4 KitKat	Android 5.1 Lollipop	Android 4.4 KitKat	Cyanogen 11S (Android 4.4)	Android 5.0 Lollipop
Processor	2.7GHz Snapdragon 805	1.82GHz Snapdragon 808	2.5GHz Snapdragon 801	2.5GHz Snapdragon 801	2.7GHz Snapdragon 805
RAM	3GB	3GB	2GB/3GB	3GB	3GB
Storage	32GB	32GB	16GB/32GB	16GB/64GB	32GB/64GB
MicroSD support	Up to 128GB	Up to 128GB	No	No	No
Graphics	Adreno 420	Adreno 418	Adreno 330	Adreno 330	Adreno 420
Screen size	5.7in	5.5in	5.5in	5.5in	5.96in
Screen resolution	1440x2560	1440x2560	1440x2560	1920x1080	1440x2560
Pixel density	515ppi	538ppi	534ppi	401ppi	493ppi
Screen technology	Super AMOLED	IPS	IPS	IPS	IPS
Front camera	3.7Mp	8Mp	2Mp	5Mp	2Mp
Rear camera	16Mp, LED flash	16Mp, LED flash	13Mp, LED flash	13Mp, LED flash	13Mp, LED flash
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM	Nano-SIM
Dual-SIM as standard	No	No	No	No	No
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth	Bluetooth 4.1	Bluetooth 4.0	Bluetooth 4.0 (aptX)	Bluetooth 4.0	Bluetooth 4.1
GPS	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass	GPS, Glonass
NFC	Yes	Yes	Yes	Yes	Yes
USB OTG	Yes	Yes	Yes	Yes	Yes
Extra features	Fingerprint, UV, heart-rate sensors, S Pen stylus	24bit/192kHz audio, rear key, IR blaster	24bit/192kHz audio, rear key	None	None
Geekbench 3.0 (single)	Not tested	Not tested	Not tested	969	Not tested
Geekbench 3.0 (multi)	3272	3513	2465	2570	3304
SunSpider	1367ms	715ms	959ms	877ms	791ms
GFXBench: T-Rex	27fps	25fps	20fps	29fps	27fps
GFXBench: Manhattan	11fps	9fps	Not tested	Not tested	12fps
Battery	3220mAh, removable	3000mAh, removable, Qi	3000mAh, removable, Qi	3100mAh, non-removable	3220mAh, non-removable, Qi
Dimensions	78.6x153.5x8.5mm	76x149x6.3-9.8mm	75x146x8.9mm	75.9x152.9x8.9mm	82x159x10.4mm
Weight	176g	155g	149g	162g	183g
Warranty	2 years	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PNHJCZ4	TINYURL.COM/ODGU48T	TINYURL.COM/OA76T73	TINYURL.COM/PK355CP	TINYURL.COM/NLZ4UD9

Best 7- & 8in tablets		1	2	3	4	5
		Google Nexus 7	Samsung Galaxy Tab S 8.4	Sony Xperia Z3 Tablet Compact	Apple iPad mini 2	Google Nexus 9
Price		£199 inc VAT	£319 inc VAT	£299 inc VAT	£239 inc VAT	£319 inc VAT
Website		Play.google.com	Samsung.com/uk	Sony.co.uk	Apple.com/uk	Play.google.com
Launch date		Aug 13	Aug 14	Sep 14	Oct 13	Oct 14
Build rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)		Android 4.3 Jelly Bean	Android 4.4 KitKat	Android 4.4 KitKat	iOS 8.2	Android 5.0 Lollipop
Processor		1.5GHz Snapdragon S4 Pro	Exynos 5420, octa-core	2.5GHz Snapdragon 801	Apple A7, Apple M7	2.3GHz nVidia Tegra K1
RAM		2GB	3GB	3GB	1GB	2GB
Storage		16GB/32GB	16GB/32GB	16GB/32GB	16GB/32GB	16GB/32GB
MicroSD support		No	Up to 128GB	Up to 128GB	No	No
Graphics		Adreno 320	ARM Mali-T628 MP6	Adreno 330	Apple A7	192-core Kepler
Screen size		7in	8.4in	8in	7.9in	8.9in
Screen resolution		1920x1200	2560x1440	1920x1200	2048x1536	2048x1536
Pixel density		323ppi	359ppi	283ppi	326ppi	287ppi
Screen technology		IPS	Super AMOLED	IPS	IPS	IPS
Front camera		1.2Mp	2.1Mp	2.2Mp	1.2Mp	1.6Mp
Rear camera		5Mp	8Mp, LED flash	8.1Mp	5Mp	8Mp, LED flash
Video recording		1080p	1080p	1080p	1080p	1080p
Cellular connectivity		4G version available	4G version available	4G version available	4G version available	4G version available
Wi-Fi		802.11b/g/n, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth		Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.1
GPS		GPS, Glonass	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass
NFC		Yes	No	Yes	No	Yes
USB OTG		Yes	Yes	Yes	No	Yes
Fingerprint scanner		No	Yes	No	No	No
Waterproof		No	No	Yes	No	No
Extra features		None	Stereo speakers	PS4 Remote Play, stereo speakers	None	BoomSound speakers
Geekbench 3.0 (single)		Not tested	Not tested	Not tested	Not tested	1904
Geekbench 3.0 (multi)		Not tested	2765	2708	Not tested	3352
SunSpider		1136ms	1089ms	1017ms	397ms	955ms
GFXBench: T-Rex		Not tested	14fps	28fps	Not tested	48fps
GFXBench: Manhattan		Not tested	3fps	11fps	Not tested	22fps
Battery		3950mAh, non-removable, Qi	4900mAh, non-removable	4500mAh, non-removable	6470mAh, non-removable	6700mAh, non-removable
Dimensions		200x114x8.65mm	126x213x6.6mm	213x124x6.4mm	134.7x7.5x200mm	153.7x228.3x8mm
Weight		299g	294g	270g	331g	425g
Warranty		1 year	1 year	1 year	1 year	1 year
FULL REVIEW		TINYURL.COM/PUJDJBY	TINYURL.COM/OUEM64Z	TINYURL.COM/NJ6VHEO	TINYURL.COM/PCJPB5L	TINYURL.COM/NQ6K77Y

Best 9- & 10in tablets



1 PC ADVISOR
RECOMMENDED



2 PC ADVISOR
RECOMMENDED



3 PC ADVISOR
RECOMMENDED













4 PC ADVISOR
RECOMMENDED























5 PC ADVISOR
RECOMMENDED






	Apple iPad Air 2	Samsung Galaxy Tab S10.5	Sony Xperia Z2 Tablet	Apple iPad Air	Google Nexus 10
Price	£399 inc VAT	£399 inc VAT	£369 inc VAT	£319 inc VAT	£389 inc VAT
Website	Apple.com/uk	Samsung.com/uk	Sony.co.uk	Apple.com/uk	Play.google.com
Launch date	Oct 14	Aug 14	Mar 14	Oct 13	Oct 12
Build rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)	iOS 8.2	Android 4.4 KitKat	Android 4.4 KitKat	iOS 8.2	Android 4.2 Jelly Bean
Processor	Apple A8X, Apple M8	Exynos 5420, octa-core	2.3GHz Snapdragon 801	Apple A7, Apple M7	1.7GHz Exynos 5250
RAM	2GB	3GB	3GB	1GB	2GB
Storage	16GB/64GB/128GB	16GB/32GB	16GB	16GB/32GB	16GB/32GB
MicroSD support	No	Up to 128GB	Up to 64GB	No	No
Graphics	Apple A8X	ARM Mali-T628 MP6	Adreno 330	Apple A7	ARM Mali T604
Screen size	9.7in	10.5in	10.1in	9.7in	10.1in
Screen resolution	2048x1536	2560x1600	1920x1200	2048x1536	2560x1600
Pixel density	264ppi	288ppi	224ppi	264ppi	300ppi
Screen technology	IPS	Super AMOLED	IPS	IPS	IPS
Front camera	1.2Mp	2.1Mp	2.2Mp	1.2Mp	1.9Mp
Rear camera	8Mp	8Mp, LED flash	8.1Mp	5Mp	5Mp, LED flash
Video recording	1080p	1080p	1080p	1080p	1080p
Cellular connectivity	4G version available	4G version available	4G version available	4G version available	No
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band	802.11b/g/n, dual-band
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	A-GPS, Glonass	GPS, Glonass	GPS, Glonass	A-GPS, Glonass	GPS, Glonass
NFC	Yes (for Apple Pay)	No	Yes	No	Yes
USB OTG	No	Yes	Yes	No	Yes
Fingerprint scanner	Yes	Yes	No	No	No
Waterproof	No	No	Yes	No	No
Extra features	None	Stereo speakers	PlayStation certified	None	None
Geekbench 3.0 (single)	1816	Not tested	967	1487	Not tested
Geekbench 3.0 (multi)	4523	2769	2719	2703	Not tested
SunSpider	Not tested	1079ms	1099ms	400ms	1329ms
GFXBench: T-Rex	48fps	14fps	27fps	23fps	Not tested
GFXBench: Manhattan	Not tested	3fps	Not tested	Not tested	Not tested
Battery	7340mAh, non-removable	7900mAh, non-removable	6000mAh, non-removable	8600mAh, non-removable	9000mAh, non-removable
Dimensions	240x169.5x6.1mm	247x177x6.6mm	266x172x6.4mm	240x169x7.5mm	264x178x8.9mm
Weight	437g	465g	439g	469g	603g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PLQXWSZ	TINYURL.COM/OESDFZO	TINYURL.COM/M8BZZUN	TINYURL.COM/NVOOF6H	TINYURL.COM/PUAG9RN






Best smartwatches					
	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	LG G Watch R	Motorola Moto 360	Sony Smartwatch 3	Asus ZenWatch	LG G Watch
Price	£195 inc VAT	£199 inc VAT	£189 inc VAT	£199 inc VAT	£159 inc VAT
Website	Lg.com/uk	Motorola.co.uk	Sony.co.uk	Uk.asus.com	Lg.com/uk
Launch date	Nov 14	Oct 14	Sep 14	Jan 15	Jul 14
Overall rating	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★★
Operating system	Android Wear	Android Wear	Android Wear	Android Wear	Android Wear
Compatibility	Android	Android	Android	Android	Android
Display	1.3in 320x320 P-OLED	1.56in 290x320 LCD	1.6in 320x320 LCD	1.6in 320x320 AMOLED	1.65in 280x280 IPS
Processor	1.2GHz Snapdragon 400	TI OMAP 3	1.2GHz ARM V7	1.2GHz Snapdragon 400	1.2GHz Snapdragon 400
RAM	512MB	512MB	512MB	512MB	512MB
Storage	4GB	4GB	4GB	4GB	4GB
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	410mAh	320mAh	420mAh	1.4Wh	400mAh
Dimensions	46.4x53.6x9.7mm	46x11.5mm	36x51x10mm	51 x39.9x7.9-9.4mm	37.9x46.5x9.95mm
Weight	62g	49g (leather band model)	45g	75g	63g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QATY8FT	TINYURL.COM/O9C69K6	TINYURL.COM/OOVZ3PN	TINYURL.COM/NN7GA7W	TINYURL.COM/QB4WL6L

Best smartwatches					
	6 PC ADVISOR RECOMMENDED	7 PC ADVISOR RECOMMENDED	8 PC ADVISOR RECOMMENDED	9 PC ADVISOR RECOMMENDED	10 PC ADVISOR RECOMMENDED
	Pebble Steel	Sony Smartwatch 2	Samsung Gear 2 Neo	Martian Notifier	Samsung Gear 2
Price	£179 inc VAT	£125 inc VAT	£169 inc VAT	£99 inc VAT	£260 inc VAT
Website	Getpebble.com	Sony.co.uk	Samsung.com/uk	Martianwatches.com	Samsung.com/uk
Launch date	Sep 14	Jun 13	Apr 14	Dec 14	Apr 14
Overall rating	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★★
Operating system	Proprietary	Proprietary	Tizen	Proprietary	Tizen
Compatibility	iOS, Android	Android	Samsung phones	iOS, Android	Samsung phones
Display	1.26in 144x168 E-Paper	1.6in 220x176 LCD	1.6in 320x320 Super AMOLED	1.01in 96x16 OLED	1.6in 320x320 Super AMOLED
Processor	Not specified	Not specified	Dual-core	Not specified	1GHz dual-core
RAM	512MB	Not specified	512MB	Not specified	512MB
Storage	Not specified	Not specified	4GB	Not specified	4GB
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	130mAh	Not specified	300mAh	Not specified	300mAh
Dimensions	46x34x10.5mm	42x41x9mm	58.8x37.9x10mm	43x43x12.7mm	36.9x58.4x10mm
Weight	156g	123g	55g	52g	68g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PPBXV7J	TINYURL.COM/P4X7AZM	TINYURL.COM/Q68F5SU	TINYURL.COM/NS9E8GK	TINYURL.COM/QXC28J3

Best activity trackers					
	1 	2 	3 	4 	5 
	Fitbit Charge HR	Fitbit Surge	Fitbit One	Microsoft Band	Fitbit Charge
Price	£119 inc VAT	£199 inc VAT	£79 inc VAT	£169 inc VAT	£99 inc VAT
Website	Fitbit.com/uk	Fitbit.com/uk	Fitbit.com/uk	Microsoft.com/en-gb	Fitbit.com/uk
Launch date	Jan 15	Jan 15	Jan 14	May 15	Nov 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Compatibility	iOS, Android, Windows	iOS, Android, Windows	iOS, Android	iOS, Android, Windows	iOS, Android, Windows
Display	OLED	Touchscreen	OLED	TFT	OLED
Pedometer	Yes	Yes	Yes	Yes	Yes
Heart-rate monitor	Yes	Yes	No	Yes	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes	Yes
Third-party app syncing	Yes	Yes	Yes	Yes	Yes
Call notifications	Yes	Yes	No	Yes	Yes
Waterproof	Yes	Yes	No	Yes	Yes
Battery life	5+ days	5 days	10-14 days	2 days	7-10 days
Dimensions, weight	21.1mm, 26g	34mm, 51g	35.5x28x9.65mm, 8g	11x33mm, 60g	21.1mm, 24g
FULL REVIEW	TINYURL.COM/PCKV4SU	TINYURL.COM/OB3DR47	TINYURL.COM/PT2TC6F	TINYURL.COM/LHMQ2AC	TINYURL.COM/PFMQ9KH

Best activity trackers					
	6 	7 	8 	9 	10 
	Basis Peak	Xiaomi Mi Band	Jawbone Up 2	Jawbone Up Move	Jawbone Up24
Price	£169 inc VAT	£29 inc VAT	£89 inc VAT	£39 inc VAT	£99 inc VAT
Website	En-gb.mybasis.com	Mobilefun.co.uk	Jawbone.com	Jawbone.com	Jawbone.com
Launch date	Apr 15	Feb 15	June 15	Nov 14	Mar 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Compatibility	iOS, Android	iOS, Android	iOS, Android	iOS, Android	iOS, Android
Display	E-Ink	No	No	No	No
Pedometer	Yes	Yes	Yes	Yes	Yes
Heart-rate monitor	Yes	No	No	No	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	No	Yes	Yes	No	Yes
Third-party app syncing	No	No	Yes	Yes	Yes
Call notifications	Yes	Yes	No	No	No
Waterproof	Yes	Yes	Splashproof	Splashproof	Splashproof
Battery life	4 days	30 days	7 days	Six months, non-rechargeable	7 days
Dimensions, weight	33x43x10mm, 51g	157x205mm, 13g	220x11.5x3-8.5mm, 25g	27.6x27.6x9.8mm, 6.8g	S: 19g, M: 22g, L: 23g
FULL REVIEW	TINYURL.COM/LHMQ2AC	TINYURL.COM/QZ3YVCR	TINYURL.COM/PHT98ZK	TINYURL.COM/PFXQFNE	TINYURL.COM/ND8YMB8

Best power banks					
	1 PC ADVISOR <small>RECOMMENDED</small>	2 PC ADVISOR <small>RECOMMENDED</small>	3 PC ADVISOR <small>RECOMMENDED</small>	4 PC ADVISOR <small>RECOMMENDED</small>	5 PC ADVISOR <small>RECOMMENDED</small>
	Zendure A2	Anker Astro Mini	Intocircuit Power Castle	Intocircuit PowerMini	Lumsing 10400mAh
Price	£33 inc VAT	£13 inc VAT	£22 inc VAT	£10 inc VAT	£17 inc VAT
Website	Zendure.com	lanker.com	Hisgadget.com	Hisgadget.com	Lumsing.com
Launch date	May 14	Apr 13	Mar 13	Jul 14	Apr 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★★
Capacity	6000mAh	3200mAh	11200mAh	3000mAh	10400mAh
Input	1x 7.5W Micro-USB	1x 4W Micro-USB	1x 5W Micro-USB	1x 5W Micro-USB	1x 7.5W Micro-USB
Outputs	1x 10.5W USB	1x 5W USB	1x 10.5W USB, 1x 5W USB	1x 5W USB	1x 10.5W USB, 1x 5W USB
Auto-on/-off	Yes	No	Auto-on	No	No
Passthrough charging	Yes	No	Yes	No	No
Status indicator	4 LEDs	No	LCD screen	3 LEDs	4 LEDs
LED flashlight	No	No	Yes	Yes	No
Carry case	Yes	Yes	Yes	Yes	Yes
Dimensions	93x48x23mm	92x23x23mm	110x71x22mm	110x20x20mm	138x59x20mm
Weight	137g	80g	280g	118g	354g
Warranty	1 year	18 months	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NGCNOSF	TINYURL.COM/PZHUHO	TINYURL.COM/P5M9NKE	TINYURL.COM/KWONES4	TINYURL.COM/Q9DYG5G

Best desktop chargers					
	1 PC ADVISOR <small>RECOMMENDED</small>	2 PC ADVISOR <small>RECOMMENDED</small>	3 PC ADVISOR <small>RECOMMENDED</small>	4 PC ADVISOR <small>RECOMMENDED</small>	5 PC ADVISOR <small>RECOMMENDED</small>
	iClever USB Travel Charger	Zendure Turbo Charger	Olixar Smart IC Charger	Inateck USB Charger	Lumsing 5-Port Charger
Price	£20 inc VAT	£25 inc VAT	£34 inc VAT	£15 inc VAT	£8 inc VAT
Website	Hisgadget.com	Zendure.com	Mobilefun.co.uk	Inateck.com	Lumsing.com
Launch date	Oct 14	May 14	Feb 15	Feb 14	Apr 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Max output	50W	40W	50W	35W	30W
Outputs:					
USB 1	12W USB	12W USB	12.5W USB	10.5W USB	10W USB
USB 2	12W USB	12W USB	12.5W USB	10.5W USB	10W USB
USB 3	12W USB	12W USB	12.5W USB	5W USB	10W USB
USB 4	12W USB	12W USB	12.5W USB	5W USB	5W USB
USB 5	12W USB	12W USB	12.5W USB	5W USB	5W USB
USB 6	12W USB	N/A	12.5W USB	N/A	N/A
Colours available	Black	Black, white	White	Black	Black
Dimensions	100x69x27mm	97x60x27mm	100x69x26mm	100x55x20mm	136x68x30mm
Weight	180g	166g	189g	340g	422g
Warranty	1 year	1 year	2 years	1 year	1 year
FULL REVIEW	TINYURL.COM/MPA4DWC	TINYURL.COM/NKYNJTP	TINYURL.COM/OCZYK93	TINYURL.COM/KBXUHDF	TINYURL.COM/LK22OGV

